Modification Form for Permit BIO-UWO-0061

Permit Holder: John Bend

PLEASE ATTACH A MATERIAL SAFETY DATA SHEET OR EQUIVALENT FOR NEW BIOLOGICAL AGENTS.
PLEASE ATTACH A BRIEF DESCRIPTION OF THE WORK THAT EXPLAINS THE BIOLOGICAL AGENTS USED AND HOW THEY WILL BE STORED, USED AND DISPOSED OF.

Approved Personnel
(Please stroke out any personnel to be removed)

Thu Chau
Yadiea Tejeda Sabalaua

Additional Personnel
(Please list additional personnel and their Biosafety training dates here)

	Please stroke out any approved Biological Agent(s) to be removed	Write additional Biological Agent(s) for approval below. Give the full name
Approved Microorganisms		- Listeria monocytogene - Listeria welshimeri - Listeria grayi - Salmonella Typhimurium - Listeria seeligeri - Staphylococcus aureus COL - Listeria innocua - Streptococcus pyogenesis - Listeria ivanovii - E. coli XL1-Blue
Approved Primary and Established Cells		- E. coli (0157:H7, 026, 045, 0145, 0103, 0111, 0121) - Campylobacter jejuni
Approved Use of Human Source Material		
Approved Genetic Modifications (Plasmids/Vectors)		
Approved Use of Animals		
Approved Biological Toxin(s)		
Approved Gene Therapy		
Approved Plants and Insects		

As the Principal Investigator, I have ensured that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at http://www.shs.uwo.ca/workplace/newposition.htm

Signature of Permit Holder: John R Byrd

Current Classification: 2 **Containment Level for Added Biohazards:** 1, 2

Date of Last Biohazardous Agents Registry Form: Sep 17, 2010

Date of Last Modification (if applicable):

BioSafety Officer(s)*:

***For work being performed at Institutions affiliated with Western University, the Safety Officer for the Institution where experiments will take place must sign the form prior to its being sent to Western University Biosafety Officer.**

Chair, Biohazards Subcommittee: **Date:**

Description of Work

Listeria monocytogenes, Salmonella typhimorium, Campylobacter jejunii, and *Escherichia coli* (O157, O26, O111, O145, O45, O121, O103) are going to be used for developing a rapid test for their detection in food. The rest of the microorganisms are going to be used for confirming the specificity of the test.

The initial cultures are prepared from a stock kept at -80°C. They are incubated overnight at 37°C and then 50 ul are transferred and subcultured in 5 ml of BHI broth at 37°C overnight for their final use in the experiments.

For decontamination we used autoclaving, alcohol 70% and hydrogen peroxide.

ATCC

MSDS'

MATERIAL SAFETY DATA SHEET

MSDS FOR MICROBIAL CULTURES (Biosafety Level 1 or 2 or 3)

MATERIAL SAFETY DATA SHEET

SECTION 1 - SUBSTANCE IDENTITY AND COMPANY INFORMATION

Product Name: Various Microbial Cultures at Biosafety Level 1 or 2 or 3
ATCC Catalog #: Various

COMPANY INFORMATION: AMERICAN TYPE CULTURE COLLECTION
PO BOX 1549
MANASSAS, VA 20108

FOR INFORMATION CALL: 800-638-6597 or 703-365-2700
AFTER-HOURS CONTACT: 703-365-2710
CHEMTREC EMERGENCY: 800-424-9300 or 703-527-3887

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Either frozen or growing cells shipped in liquid cell culture medium (a mixture of components that may include, but is not limited to: inorganic salts, vitamins, amino acids, carbohydrates and other nutrients dissolved in water). Frozen Cultures may also contain a 5%-10% solution of Dimethyl sulfoxide as a cryoprotectant.

SECTION 3 - HAZARD IDENTIFICATION

HMIS Rating: N/A
NFPA Rating: N/A

This substance is not hazardous as defined by OSHA 29CFR 1910.1200 however this product should be handled according to good lab practices, with proper personal protective equipment, proper engineering controls and within the parameters of the purchaser's safety program.

Health Hazards

ATCC recommends that all ATCC microbial cultures be handled by qualified microbiologists using appropriate safety procedures and precautions. Detailed discussions of laboratory safety procedures are provided in **Laboratory Safety: Principles and Practice** (Fleming et al) and in the U.S. Government Publication, **Biosafety in Microbiological and Biomedical Laboratories.** This publication is available in its entirety in the Center for Disease Control Office of Health and Safety's web site at http://www.cdc.gov/biosafety/publications/bmbl5/index.htm .
Information on the classification of human etiologic agents on the basis of hazard can be found as Appendix B in the NIH **Guidelines for Research Involving Recombinant DNA Molecules** at http://grants.nih.gov/grants/policy/recombinentdnaguidelines.htm.

SECTION 4 - FIRST AID MEASURES

Report to your Safety Office and Seek Medical Attention as Soon as Possible

Ingestion: If person is unconscious seek emergency medical attention; never give anything by mouth to an unconscious person. If the person is conscious wash mouth out with copious amounts of water and call a physician then administer three cupfuls of water. Do not induce vomiting unless directed to do so by a physician.

Inhalation: If person is unconscious seek emergency medical attention, if person is conscious remove to fresh air and call a physician.

Dermal exposure: Immediately wash skin with copious amounts of water followed by washing with soap and copious amounts of water. Remove all contaminated clothing.

Eye exposures: Flush eyes with copious amounts of water for at least 15 minutes with eyelids separated and call a physician.

SECTION 5 - FIRE FIGHTING MEASURES

Flammability: Data not available

Suitable Extinguishing Media: Water spray, carbon dioxide, dry chemical powder, Halon (where regulations permit), or appropriate foam.

Firefighting

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent inhalation, ingestion, skin and eye contact.

Specific Hazard(s): Responders should take into consideration the biohazard risk associated with responding to a fire in the area where the material may be stored or handled.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Procedure(s) of Personal Precaution(s): At a minimum use PPE listed in Section 8. Wear laboratory coat, gloves and eye protection. Avoid all contact.Methods for Cleaning Up

Patient/Victim: Wash with soap and water. Work clothes should be laundered separately. Launder contaminated clothing before re-use. Do not take clothing home.

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

Note: The use of additional PPE may be necessary for cleaning solutions.

SECTION 7 - HANDLING AND STORAGE

Handle and store according to instructions on product information sheet and label.
Special Requirements:
Follow established laboratory procedures when handling material.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Use Personal Protective Equipment: Including Eye Protection, Chemical Resistant Gloves, and appropriate clothing to prevent skin exposure. In addition, a Respiratory protection program that complies with OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Engineering Controls: The use and storage of this material requires user to maintain and make available appropriate eyewash and safety shower facilities. Use fume hood or other appropriate ventilation method to keep airborne concentrations a low as possible.

Exposure Limits: No exposure limits for this material have been established by ACGIH, NIOSH, or OSHA.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Data Not Available

SECTION 10 - STABILITY AND REACTIVITY

Hazardous polymerization will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

Route of Exposure

Eye Contact: Data not available. Avoid eye contact.
Skin Contact: Data not available. Avoid skin contact.
Skin Absorption: Data not available. Avoid skin absorption.
Inhalation: Data not available. Avoid inhalation.
Ingestion: Data not available. Avoid ingestion.
Parenteral Exposure: Data not available. Avoid parenteral exposure.

Sensitization
Skin: Data not available
Respiratory: Data not available

Target Organ(s) or System(s): Data not available

Signs and Symptoms of Exposure
Skin and Mucous Membranes: Data not available
Respiratory: Data not available
Gastrointestinal: Data not available

Toxicity Data: Data not available
Effects of Long Term or Repeated Exposure: Data not available
Chronic Exposure–Teratogen: Data not available
Chronic Exposure–Mutagen: Data not available
Chronic Exposure–Reproductive Hazard: Data not available

SECTION 12 - ECOLOGICAL INFORMATION

No ecological information available.

SECTION 13 - DISPOSAL CONSIDERATIONS

Decontaminate all wastes before disposal (steam sterilization, chemical disinfection, and/or incineration).

Dispose of in accordance with applicable regulations.

SECTION 14 - TRANSPORT INFORMATION

Contact ATCC for transport information.

SECTION 15 - REGULATORY INFORMATION

Contact ATCC for regulatory information.

SECTION 16 - OTHER INFORMATION

THE INFORMATION PRESENTED IN THIS DOCUMENT IS BELIEVED TO BE CORRECT BASED UPON DATA AVAILABLE TO ATCC. USERS SHOULD MAKE AN INDEPENDENT DECISION REGARDING THE ACCURACY OF THIS INFORMATION BASED ON THEIR NEEDS AND DATA AVAILABLE TO THEM. ALL SUBSTANCES AND MIXTURES MAY PRESENT UNKNOWN HAZARDS AND ALL NECESSARY SAFETY PRECAUTIONS SHOULD BE TAKEN. ATCC ASSUMES NO LIABILITY RESULTING FROM USING OR COMING IN CONTACT WITH THIS SUBSTANCE.

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

Listeria monocytogenes - Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Listeria monocytogenes***

SYNONYM OR CROSS REFERENCE: Listeriosis, Listerella

CHARACTERISTICS: Gram-positive, non-spore forming, aerobic bacilli; hemolytic and catalase positive; tendency to form chains and palisades, growth at 4° C, intracellular; food-borne human pathogen usually caused by serovars 1/2a, 1/2b and 4b

SECTION II - HEALTH HAZARD

PATHOGENICITY: Opportunistic pathogen manifested in the elderly, in neonates and or among immunocompromised individuals as meningoencephalitis and/or septicemia; inapparent infection at all ages with consequence only during pregnancy; perinatal infections occur transplacentally and can result in abortion, stillbirth; meningitis, endocarditis, septicemia, and disseminated granulomatous lesions in adults

EPIDEMIOLOGY: Uncommonly diagnosed infection; typically sporadic; few recent outbreaks associated with food; nosocomial acquisition; 40% of clinical cases occur in infants; in adults infection occurs mainly after age 40; European studies have disclosed large numbers of human carriers; case fatality rate in newborns is 50%

HOST RANGE: Mammals, birds, fish, crustaceans and insects

INFECTIOUS DOSE: Not known

MODE OF TRANSMISSION: In neonates, transmission from mother to fetus *in utero* or during passage through infected birth canal; direct contact with infectious material or soil contaminated with infected animal feces can result in papular lesions on hands and arms; ingestion of contaminated food (vegetables and dairy products have been reported); venereal contact and inhalation of the organism is possible; nursery outbreaks via hands of medical staff

INCUBATION PERIOD: Variable, outbreak cases have occured 3-70 days following a single exposure to an implicated product, median incubation is estimated at 3 weeks

COMMUNICABILITY: Mothers of infected newborn infants may shed the agent for 7-10 days after delivery; infected individuals can shed organism in the stool for several months

SECTION III - DISSEMINATION

RESERVOIR: Infected domestic and wild mammals, fowl and humans; infection of foxes produces an encephalitis simulating rabies; asymptomatic fecal carriage in man (5%) and animals; frequently found in free-living water and mud; seasonal use of silage as fodder is frequently followed by an increased

incidence of listeriosis in animals

ZOONOSIS: Yes, all domestic and wild animals are susceptible; proper precautions by farmers and veterinarians in handling aborted fetuses are recommended

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Sensitive to penicillin, ampicillin, aminoglycosides, tetracyclines (resistance has been observed), chloramphenicol

SUSCEPTIBILITY TO DISINFECTANTS: Moderately susceptible to disinfectants - 1% sodium hypochlorite, 70% ethanol, glutaraldehyde

PHYSICAL INACTIVATION: Sensitive to moist heat (121° C for at least 15 min) and dry heat (160-170° C for at least 1 hour); able to grow at low temperatures (-0.4 to -0.1° C); sensitive to short wave UV and gamma irradiation

SURVIVAL OUTSIDE HOST: Survives well in soil, water, food, feces

SECTION V - MEDICAL

SURVEILLANCE: Found in feces, CSF, blood; routine smear from all newborn infants examined for *L. monocytogenes*

FIRST AID/TREATMENT: Antibiotic therapy, penicillin or ampicillin alone or together with aminoglycosides; resistant to cephalosporins including third generation cephalosporins

IMMUNIZATION: None

PROPHYLAXIS: None

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: Not a common laboratory-associated infection; 2 reported infections

SOURCES/SPECIMENS: Cerebrospinal fluid, blood, placental or fetal tissue, genital tract secretions, amniotic fluid

PRIMARY HAZARDS: Experimentally infected animals are a risk factor to laboratory workers; ingestion is the common mode of exposure, however may cause eye and skin infection following direct exposure; parenteral inoculation, ingestion, exposure to highly concentrated aerosols

SPECIAL HAZARDS: None

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices, containment equipment and facilities for all activities involving clinical materials or cultures; biosafety cabinets should be used for activities likely to generate aerosols

PROTECTIVE CLOTHING: Laboratory coat; gloves and eye protection when direct contact with infectious materials is unavoidable

OTHER PRECAUTIONS: Pregnant women should avoid contact with infected materials

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wear protective clothing; gently cover spill with paper towels 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, incineration

STORAGE: In sealed containers that are appropriately labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: March, 2001

Prepared by: Office of Laboratory Security, PHAC

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Date Modified: 2011-02-18

Escherichia coli, enterohemorrhagic - Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - 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

SECTION II - HEALTH HAZARD

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

SECTION III - 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

SECTION IV - 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 (innoculum 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

SECTION V - 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

SECTION VI - LABORATORY HAZARDS

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

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

PRIMARY HAZARDS: Ingestion

SPECIAL HAZARDS: None

SECTION VII - RECOMMENDED PRECAUTIONS

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 handwashing essential

SECTION VIII - HANDLING INFORMATION

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 labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: January, 2001

Prepared by: Office of Laboratory Security, PHAC

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Date Modified: 2011-02-18

To whom it may concern:

We herewith confirm for the following strain:

DSM 17076 *Escherichia coli*

that it is allocated to the Risk Group 2 acc. to European and German legislation. It is pathogenic to humans but is not genetically modified. The above strain will be packaged, labeled and transported in accordance with all applicable regulations.

Use is for scientific purposes only.

The exporter of the products covered by this document declares that they are of German preferential origin.

Handling and Safety Instructions

All consignments containing microorganisms must be unpacked in an appropriately equipped laboratory. Microorganisms, including genetically engineered strains, may be pathogenic to humans, animals or plants. Therefore, cultures must be handled by, or under the supervision of persons trained and competent in microbiological techniques. Before handling the organism, the user has to inform himself of national regulations governing work with microorganisms. Cultivation and handling is restricted to laboratories meeting the containment requirements laid down by the national authorities. DSMZ delivers only biological material which can be handled up to containment level 2.

Please see detailed information below:

1. Identification of the Biological Agent

- Microbial culture, inoculum for preparing cultures, for laboratory use only!
- Species name and strain number as given on delivery note
- Form of supplied material: freeze-dried or actively growing culture

2. Hazards Identification: RiskAssessment and Laboratory Containment Level

- Each microorganism delivered with this consignment is classified according to German legislation (Biostoff-Verordnung). If a strain is allocated to Risk Group 2 (equivalent terms are Hazard Group or Biological Safety Level), this information is given on the DSMZ homepage under the respective species information and on the delivery note.

- Required laboratory containment level: corresponds to the Risk Group of the microorganism. Observe national regulations.
- Apart from infectivity/pathogenicity, genetically modified microorganisms are to be handled according to relevant national legislation and under contained use only.
- Toxin production, if known: see 7.
- Avoid all direct physical contact with the organism. Control dust (aerosols), skin and eye contact.

3. First Aid Measures

In case of contact, wash contaminated skin thoroughly with antiseptic soap and water. If wound contamination is suspected, seek immediate medical attention. In case of ingestion/inhalation, seek immediate medical attention. Inform medical practitioner of name of the microorganism.

4. Accidental Release Measures and Spillage/Environmental Precautions

- Decontaminate/sterilize/autoclave all material which might be in contact with the culture.
- Keep culture material away from drains, surface-and ground-water and soil.
- If culture vial is accidentally broken, soak contaminated area with appropriate disinfectant.
- Broken glass has to be picked up with forceps.

5. Handling and Storage

- Ampoules/cultures must be opened and used by trained persons in a laboratory of appropriate safety level.
- All cultures delivered by DSMZ are for immediate use (see our conditions of delivery). Before use, store cultures in a cool, dark place.
- Instructions for opening of ampoules with dried cultures are provided with this handout.

6. Exposure Controls/Personal Protection

Depends upon the Risk Group of delivered culture and is described in the respective containment level instructions (in Germany, see the Biostoff-Verordnung). Precautionary measures such as lab coat and, if required, protective gloves and glasses minimise worker's exposure.

7. Toxicological Information

See strain information as given in the DSMZ catalogue of strains (online catalogue: . Possible restrictions on handling and distribution of certain toxin producers are given on page VIII, DSMZ catalogue of strains. Information given by DSMZ on possible or known toxin production of any strain is not exhaustive! DSMZ does not perform toxicity tests with cultures.

8. Disposal

Sterilize all cultures before disposal.

Supplier:

Leibniz-Institut DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH
Inhoffenstraße 7 B
38124 Braunschweig

Version of this Information sheet: August 2012

Braunschweig, 27 August 2012

Dr. Christine Rohde
Leibniz-Institut DSMZ-Deutsche Sammlung von Miroorganismen und Zellkulturen GmbH

Salmonella typhi - Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Salmonella typhi***

SYNONYM OR CROSS REFERENCE: Typhoid fever, Enteric fever, Typhus abdominalis, *Salmonella choleraesuis* serotype typhi, *Salmonella enterica* serotype typhi

CHARACTERISTICS: Family Enterobacteriaceae; Gram negative rod; motile, aerobic and facultatively anaerobic; serological identification of somatic, flagellar and Vi antigens

SECTION II - HEALTH HAZARD

PATHOGENICITY: Generalized systemic enteric fever, headache, malaise, anorexia, enlarged spleen, and constipation followed by more severe abdominal symptoms; rose spots on trunk in 25% of Caucasian patients; complications include ulceration of Peyer's patches in ileum, can produce hemorrhage or perforation; Common enterocolitis may result without enteric fever; characterized by headache, abdominal pain, nausea, vomiting, diarrhea, dehydration may result; case fatality of 16% reduced to 1% with antibiotic therapy; mild and atypical infections occur

EPIDEMIOLOGY: Worldwide; sporadic cases in North America; most cases represent importation from endemic areas; multi-drug resistant strains have appeared in several areas of world

HOST RANGE: Humans

INFECTIOUS DOSE: 100,000 organisms - ingestion; variable with gastric acidity and size of inoculum

MODE OF TRANSMISSION: Person-to-person; by contaminated food or water; by food contaminated by hands of carriers; flies can infect foods in which the organisms may multiply to achieve an infective dose

INCUBATION PERIOD: Depends on size of infecting dose; usually 1-3 weeks

COMMUNICABILITY: Communicable as long as typhoid bacilli appear in excreta; usually 1st week throughout convalescence; 10% of patients discharge bacilli for 3 months after onset; 2-5% become chronic carriers, may shed bacteria for years

SECTION III - DISSEMINATION

RESERVOIR: Humans - patients with acute illness and chronic carriers

ZOONOSIS: None

VECTORS: Possibly flies (mechanical only)

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Susceptible to chloramphenicol, ampicillin, amoxicillin, TMP-SMX, fluoroquinolones; Multi-drug resistant (MDR) strains are on the rise; drug susceptibility testing is required

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde, iodines, phenolics, formaldehyde

PHYSICAL INACTIVATION: Sensitive to moist heat (121° C for at least 15 min) and dry heat (160-170° C for at least 1 hour)

SURVIVAL OUTSIDE HOST: Ashes - 130 days; rabbit carcass - 17 days; dust - up to 30 days; feces - up to 62 days; linoleum floor - 10 hours; ice - 240 days; skin - 10-20 min

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; bacteriological examination of blood, excreta; serology not effective

FIRST AID/TREATMENT: Antibiotic therapy for enteric fever; determine appropriate antibiotic with drug susceptibility testing

IMMUNIZATION: Two typhoid vaccines licensed in Canada, one injectable one oral; vaccine administered for occupational exposure or travel to endemic areas for greater than 4 weeks; does not offer complete protection, immunity may be overwhelmed by large inoculum; oral vaccine is contraindicated in immunocompromised and pregnant individuals

PROPHYLAXIS: Antibiotic prophylaxis

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: Typhoid is the second most commonly reported laboratory infection; at least 256 reported cases with 20 deaths

SOURCES/SPECIMENS: Feces, urine, bile, blood

PRIMARY HAZARDS: Ingestion, parenteral inoculation; importance of aerosol exposure not known

SPECIAL HAZARDS: None

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices, containment equipment, and facilities for all activities utilizing known or potentially infectious clinical materials and cultures

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

OTHER PRECAUTIONS: Good personal hygiene and frequent hand washing; vaccination for those regularly working with *S. typhi* cultures or clinical materials

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wearing protective clothing; gently cover spill with paper towels 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 labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: March, 2001

Prepared by: Office of Laboratory Security, PHAC

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Date Modified: 2011-02-18

Staphylococcus aureus - Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Staphylococcus aureus***

SYNONYM OR CROSS REFERENCE: Staphylococcal diseases, impetigo, toxic shock syndrome, food poisoning, intoxication

CHARACTERISTICS: Gram positive cocci, usually in clusters; coagulase positive; non-spore forming; non-motile; many strains produce exotoxins including staphylococcal enterotoxins A,B,C,D,E, toxic shock syndrome toxin (TSST-1) and exfoliative toxins A, and B

SECTION II - HEALTH HAZARD

PATHOGENICITY: Opportunistic pathogen, normal flora; produces a variety of syndromes with a range of clinical manifestations; clinically different in general community, newborns, menstruating women, and hospitalized patients; food intoxication is characterized by abrupt/violent onset, severe nausea, cramps, vomiting, and diarrhea using lasting 1-2days; animal bites can result in localized infections; may cause surface or deep/system infections in both community and hospital settings; surface infections include impetigo, folliculitis, abscesses, boils, infected lacerations; deep infections include endocarditis, meningitis, septic arthritis, pneumonia, osteomyelitis; systemic infection may cause fever, headache malaise, myalgia; newborns are susceptible to scalded skin syndrome (SSS) caused by exfoliative toxins; my be colonized during delivery resulting in sepsis meningitis; toxic shock syndrome is an acute multi-system illness caused by TSST-1 a super antigen; characterized by sudden onset, high fever, vomiting, profuse watery diarrhea, myalgia, hypotension erythematous rash

EPIDEMIOLOGY: Occurs worldwide; particularly in areas where personal hygiene is suboptimal; in hospitals by development of antibiotic-resistant strains

HOST RANGE: Humans; to a lesser extent, warm-blooded animals

INFECTIOUS DOSE: Virulence of strains varies greatly

MODE OF TRANSMISSION: Contact with nasal carriers (30-40% of population); from draining lesions or purulent discharges; spread person-to-person; ingestion of food containing staphylococcal enterotoxin (food may be contaminated by food handlers hands); from mother to neonate during delivery

INCUBATION PERIOD: Variable and indefinite, commonly 4-10 days; disease may not occur until several months after colonization; interval between eating food and onset of symptoms is usually 2-4 hours (30 min to 8 hours)

COMMUNICABILITY: As long as purulent lesions continue to drain or carrier state persists; auto-infection may continue for the period of nasal colonization or duration of active lesions

SECTION III - DISSEMINATION

RESERVOIR: Human; patients with indwelling catheters or IVs act as reservoirs for nosocomial infections; food borne - occasionally cows with infected udders

ZOONOSIS: Yes - direct or indirect contact with infected animals

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Many strains are multi-resistant to antibiotics and are of increasing importance; methicillin resistant (MRSA) strains have caused major outbreaks world-wide; Vancomycin resistant (VRSA) are being increasingly isolated; sensitivity must be determined for each strain

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, iodine/alcohol solutions, glutaraldehyde, formaldehyde

PHYSICAL INACTIVATION: Organisms are destroyed by heat (moist heat - 121° C for at least 15 min, dry heat - 160-170° C for at least 1 hour; enterotoxins are heat resistant, stable at boiling temperature

SURVIVAL OUTSIDE HOST: Carcass and organs - up to 42 days; floor - less than 7 days; glass - 46 hours; sunlight - 17 hours; UV - 7 hours; meat products - 60 days; coins - up to 7 days; skin from 30 min to 38 days

SECTION V - MEDICAL

SURVEILLANCE: Monitor for skin inflammation if wounded by a sharp instrument; isolation of organism from wound or blood, CSF, urine; isolation of> 10^5 organisms or enterotoxin from suspected food

FIRST AID/TREATMENT: Fluid replacement for food poisoning; in localized skin infections, drain abscesses; antibiotic therapy for severe infections

IMMUNIZATION: None

PROPHYLAXIS: None

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 29 reported cases up to 1973 with 1 death

SOURCES/SPECIMENS: Clinical specimens - blood, abcesses, lesion exudates, CSF, respiratory specimens, feces, urine

PRIMARY HAZARDS: Injuries from contaminated sharp instruments; ingestion; aerosols

SPECIAL HAZARDS: Direct contact with open cuts and lesions of skin

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices, containment equipment and facilities for activities with cultures or potentially infectious clinical materials

PROTECTIVE CLOTHING: Laboratory coat: gloves when skin contact is unavoidable

OTHER PRECAUTIONS: Thorough handwashing before leaving the laboratory and after handling infectious materials

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wear protective clothing; gently cover spill with 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 labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: March, 2001

Prepared by: Office of Laboratory Security, PHAC

Although the information, opinions and recommendations contained in this Material Safety Data Sheet are compiled from sources believed to be reliable, we accept no responsibility for the accuracy, sufficiency, or reliability or for any loss or injury resulting from the use of the information. Newly discovered hazards are frequent and this information may not be completely up to date.

Date Modified: 2011-02-18

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

STREPTOCOCCUS PYOGENES

PATHOGEN SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: *Streptococcus pyogenes*

SYNONYM OR CROSS REFERENCE: Group A (β-hemolytic) streptocci (GAS), streptococcal sore throat, strep throat, pharyngitis, scarlet fever, impetigo, erysipelas, puerperal fever, necrotizing fasciitis, toxic shock syndrome, septicaemia, acute rheumatic fever, acute post-streptococcal glomerulonephritis, gas gangrene

CHARACTERISTICS: *Streptococcus pyogenes* is an aerobic, gram-positive extracellular bacterium [1, 2]. It is made up of non-motile, non-sporing cocci that are less then 2 µm in length and that form chains and large colonies greater then 0.5 mm in size [3, 4]. It has a β-hemolytic growth pattern on blood agar and there are over 60 different strains of the bacterium [5, 6]

SECTION II – HAZARD IDENTIFICATION

PATHOGENICITY/TOXICITY: This bacterium is responsible for a wide array of infections [7, 8]. It can cause streptococcal sore throat which is characterized by fever, enlarged tonsils, tonsillar exudate, sensitive cervical lymph nodes and malaise [6, 9]. If untreated, strep throat can last 7-10 days [9]. Scarlet fever (pink-red rash and fever) as well as impetigo (infection of the superficial layers of skin) and pneumonia are also caused by this bacterium [3, 6, 7, 10]. Septicaemia, otitis media, mastitis, sepsis, cellulitis, erysipelas, myositis, osteomyelitis, septic arthritis, meningitis, endocarditis, pericarditis, and neonatal infections are all less common infections due to *S. pyogenes* [3, 6, 7]. Streptococcal toxic shock syndrome, acute rheumatic fever (joint inflammation, carditis and CNS complications), post-streptococcal glomerulonephritis (inflammation, hematuriia, fever, edema, hypertension, urinary sediment abnormalties and severe kidney pain) and necrotizing fasciitis (rapid and progressive infection of subcutaneous tissue, massive systematic inflammation, hemorrhagic bullae, crepitus and tissue destruction) are some of the more serious complications involving *S. pyogenes* infections [1, 6-8]. There are at least 517,000 deaths globally each year due to severe *S. pyogenes* infections and rheumatic fever disease alone causes 233,000 deaths [8]. 1,800 invasive *S. pyogenes* disease-related deaths are reported in the USA yearly, necrotizing fasciitis kills about 30% of patients and streptococcal toxic shock syndrome has a mortality rate of 30-70% [3, 11, 12].

EPIDEMIOLOGY: Different clinical manifestations of this bacterium are more common in different parts of the world. Streptococccal pharyngitits is predominant in temperate areas and peaks in late winter and early spring [5, 9]. There are 616 million cases of pharyngitis caused by *S. pyogenes* world-wide each year [5, 8]. 15-20% of school-aged children has *S. pyogenes* in its carrier form in their throats and are more at risk of having the disease [5, 9]. Impetigo is more common with children in warm humid climates and there are 111 million reported cases world-wide each year [5]. There are 115.6 million cases of rheumatic heart disease yearly and at least 18.1 million cases of invasive infections, predominantly in older populations [3, 8]. Post-streptococcal glomerulonephritis is seasonal and is more common in children, young adults and males [1]. Crowding and poor hygiene increase the chance of an outbreak of GAS

infections [1].

HOST RANGE: *S. pyogenes* is an exclusively human pathogen [5, 7].

INFECTIOUS DOSE: Unknown.

MODE OF TRANSMISSION: Transmission via respiratory droplets, hand contact with nasal discharge and skin contact with impetigo lesions are the most important modes of transmission [5, 9, 13]. The pathogen can be found in its carrier state in the anus, vagina, skin and pharynx and contact with these surfaces can spread the infection [5, 14, 15] The bacterium can be spread to cattle and then back to humans through raw milk as well as through contaminated food sources (salads, milk, eggs); however, cattle do not contract the disease [16-18]. Necrotizing fasciitis is usually because of contamination of skin lesions or wounds with the infectious agent [12].

INCUBATION PERIOD: The incubation period is usually 1-3 days [9].

COMMUNICABILITY: If untreated, patients with streptococcal pharyngitis are infective during the acute phase of the illness, usually 7-10 days, and for one week afterwards; however, if antibiotics are used, the infective period is reduced to 24 hours [9]. The bacterium can remain in the body in its carrier state without causing illness in the host for weeks or months and is transmissible in this state [5].

SECTION III - DISSEMINATION

RESERVOIR: Humans are primary reservoir for this bacterium [5, 7], although cattle can also act as a reservoir [16-18].

ZOONOSIS: Cows infected by humans are intermediate hosts and can pass the bacterium in their milk, which, if consumed unpasteurized, can infect other humans [16].

VECTORS: None.

SECTION IV – STABILITY AND VIABILITY

DRUG SUSCEPTIBILITY: *S. pyogenes* infections are susceptible to a variety of drugs: β-lactams such as penicillin, as well as erythromycin, clindamycin, imipenem, rifampin, vanomycin, macrolides and lincomycin; however, certain strains of the bacterium have been found to resistant to macrolides, lincomycin, chloramphenicol, tetracyclines and cotrimoxazole [5, 7, 19, 20].

SUSCEPTIBILITY TO DISINFECTANTS: This bacteria is susceptible to 1% sodium hypochlorite, 4% formaldehyde, 2% glutaraldehyde, 70% ethanol, 70% propanol, 2% peracetic acid, 3-6% hydrogen peroxide and 0,16% iodine [2].

PHYSICAL INACTIVATION: Bacteria are susceptible to moist heat (121 °C for at least 15 minutes) and dry heat (170 °C for at least 1 hour) [21].

SURVIVAL OUTSIDE HOST: The bacterium can survive on a dry surface for 3 days to 6.5 months [22]. It has been found to survive in ice cream (18 days), raw and pasteurized milk at 15-37 °C (96 hrs), room temperature butter (48 hrs), and neutralized butter (12-17 days) [17]. GAS has been found to last several days in cold salads at room temperature [18].

SECTION V – FIRST AID / MEDICAL

SURVEILLANCE: Monitor for symptoms. Confirm infection by bacteriological and serological testing, latex bead agglutination, fluorescent antibody staining or ELISA [6].

Note: All diagnostic methods are not necessarily available in all countries.

UPDATED: July 2010

PREPARED BY: Pathogen Regulation Directorate, Public Health Agency of Canada.

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FIRST AID/TREATMENT: Appropriate antibiotic treatment is necessary for a *S. pyogenes* infection. Penicillin is used for respiratory tract infections (pharyngitis) and macrolides or lincosamides are used if there are allergies (5, 6). Clindamycin may be used in cases of necrotizing fasciitis and surgical debridement of the affected area is necessary (2, 5).

IMMUNIZATION: None (6).

PROPHYLAXIS: Administering penicillin to carriers has been shown to reduce the number of people infected during an outbreak of streptococcal sore throat (18).

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 78 laboratory-acquired infections by streptococcal agents have been reported as of 1983 (2).

SOURCES/SPECIMENS: Respiratory specimens, skin lesions, blood, sputum and wound exudates contain the infectious agent (5, 13, 23).

PRIMARY HAZARDS: Inhalation of infectious aerosols and contamination of mucocutaneous lesions are the primary hazards associated with working with this pathogen (1, 2, 10)

SPECIAL HAZARDS: None

SECTION VII – EXPOSURE CONTROLS / PERSONAL PROTECTION

RISK GROUP CLASSIFICATION: Risk group 2 (24).

CONTAINMENT REQUIREMENTS: Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potentially infectious material, 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 (25).

OTHER PRECAUTIONS: All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC) (25). 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 (25).

SECTION VIII - HANDLING AND STORAGE

SPILLS: Allow aerosols to settle and, wearing protective clothing, gently cover spill with paper towels and apply appropriate disinfectant, starting at the perimeter and working towards the centre. Allow sufficient contact time before clean up (25).

DISPOSAL: Decontaminate all wastes before disposal by incineration, chemical disinfection or steam sterilization (25).

STORAGE: The infectious agent should be stored in a sealed and identified container (25).

SECTION IX – REGULATORY AND OTHER INFORMATION

REGULATORY INFORMATION: The import, transport, and use of pathogens in Canada is regulated under many regulatory bodies, including the Public Health Agency of Canada, Health Canada, Canadian Food Inspection Agency, Environment Canada, and Transport Canada. Users are responsible for ensuring they are compliant with all relevant acts, regulations, guidelines, and standards.

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Date Modified: 2011-02-18

Conforms to ANSI Z400.1 Standard (United States)

Material Safety Data Sheet

Agilent Technologies

Stratagene XL1-Blue E. coli Host Strain Catalog #200268

1. Product and company identification

Product name	: Stratagene XL1-Blue E. coli Host Strain Catalog #200268
Material uses	: Analytical reagent. 0.5 ml
Supplier/Manufacturer	: Agilent Technologies, Inc. 1834 State Highway 71 West Cedar Creek, TX 78612
Part No.	: 200268
Validation date	: 03/30/2011
In case of emergency	: 1-800-894-1304

2. Hazards identification

Physical state	: Liquid.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview

Signal word	: CAUTION!
Hazard statements	: MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Precautions	: Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Potential acute health effects

Inhalation	: Slightly irritating to the respiratory system.
Ingestion	: No known significant effects or critical hazards.
Skin	: Slightly irritating to the skin.
Eyes	: Moderately irritating to eyes.

Potential chronic health effects

Chronic effects	: Contains material that may cause target organ damage, based on animal data.
Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.
Developmental effects	: No known significant effects or critical hazards.
Fertility effects	: No known significant effects or critical hazards.
Target organs	: Contains material which may cause damage to the following organs: kidneys, upper respiratory tract, skin, eye, lens or cornea.

Over-exposure signs/symptoms

Inhalation	: Adverse symptoms may include the following: respiratory tract irritation coughing
Ingestion	: No specific data.
Skin	: Adverse symptoms may include the following: irritation redness

2. Hazards identification

Eyes : Adverse symptoms may include the following:
irritation
watering
redness

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

3. Composition/information on ingredients

Name	CAS number	%
Glycerol	56-81-5	10 - 30
Sodium chloride	7647-14-5	0.1 - 1

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : No action shall be taken involving any personal risk or without suitable training.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
metal oxide/oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

7. Handling and storage

Handling : Potentially biohazardous material. Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Ingredient	Exposure limits
Glycerol	**ACGIH TLV (United States, 2/2010).** TWA: 10 mg/m³ 8 hour(s). Form: Inhalable fraction. See Appendix C, paragraph A. Inhalable Particulate Mass TLVs (IPM–TLVs) for those materials that are hazardous when deposited anywhere in the respiratory tract. **OSHA PEL (United States, 6/2010).** TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction TWA: 15 mg/m³ 8 hour(s). Form: Total dust **OSHA PEL 1989 (United States, 3/1989).** TWA: 5 mg/m³ 8 hour(s). Form: Respirable fraction TWA: 10 mg/m³ 8 hour(s). Form: Total dust

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

8. Exposure controls/personal protection

Hygiene measures : Handle as biohazard material (Biosafety level 1).
Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Other protection : Not available.

9. Physical and chemical properties

Physical state : Liquid.

Flash point : Not available.

Auto-ignition temperature : Not available.

Flammable limits : Not available.

Color : Not available.

Odor : Not available.

pH : 7

Boiling/condensation point : 100°C (212°F)

Melting/freezing point : 0°C (32°F)

Density : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Odor threshold : Not available.

Evaporation rate : Not available.

Solubility : Easily soluble in the following materials: cold water and hot water.

10. Stability and reactivity

Chemical stability : The product is stable.

Conditions to avoid : No specific data.

Materials to avoid : Reactive or incompatible with the following materials: oxidizing materials, reducing materials, metals, acids and alkalis.
Slightly reactive or incompatible with the following materials: organic materials and moisture.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Glycerol	LD50 Oral	Rat	12600 mg/kg	-
Sodium chloride	LC50 Inhalation Dusts and mists	Rat	>42 g/m³	1 hours
	LD50 Oral	Rat	3000 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Glycerol	Eyes - Mild irritant	Rabbit	-	-	-
	Skin - Mild irritant	Rabbit	-	-	-
Sodium chloride	Eyes - Moderate irritant	Rabbit	-	-	-
	Skin - Mild irritant	Rabbit	-	-	-

Sensitizer

Conclusion/Summary : Not available.

Chronic toxicity / Carcinogenicity / Mutagenicity / Teratogenicity / Reproductive toxicity

Not available.

12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
Glycerol	Acute LC50 54 to 57 ml/L Fresh water	Fish - Oncorhynchus mykiss - 0.9 g	96 hours
Sodium chloride	Acute EC50 402600 to 469200 ug/L Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 >5600 ppm Fresh water	Crustaceans - Asellus communis	48 hours
	Acute LC50 1000000 ug/L Fresh water	Fish - Morone saxatilis - LARVAE	96 hours

Conclusion/Summary : Not available.

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information

DOT / IMDG / IATA / : Not regulated.

15. Regulatory information

HCS Classification : Irritating material
Target organ effects

U.S. Federal regulations : **TSCA 8(a) IUR**: Partial exemption

United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Sodium chloride; Glycerol
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Sodium chloride: Immediate (acute) health hazard, Delayed (chronic) health hazard; Glycerol: Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

15. Regulatory information

State regulations

Massachusetts	: The following components are listed: GLYCERINE MIST
New York	: None of the components are listed.
New Jersey	: The following components are listed: GLYCERIN; 1,2,3-PROPANETRIOL
Pennsylvania	: The following components are listed: 1,2,3-PROPANETRIOL

California Prop. 65

No products were found.

16. Other information

Label requirements	: MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Date of issue	: 03/30/2011
Date of previous issue	: No previous validation.
Version	: 1

Indicates information that has changed from previously issued version.

Notice to reader

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Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

Campylobacter fetus ssp. fetus - Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Campylobacter jejuni, C. coli, C. fetus* subsp. *jejuni***

SYNONYM OR CROSS REFERENCE: *Campylobacter* enteritis, Vibrionic enteritis, Traveller's diarrhea

CHARACTERISTICS: Gram negative spiral and S-shaped bacteria; darting motility; microaerophilic; will grow only under reduced oxygen tension; optimal growth temperature is at 42C

SECTION II - HEALTH HAZARD

PATHOGENICITY: Acute enteric disease of variable severity; diarrhea, abdominal pain, malaise, fever, nausea and vomiting; prolonged illness in up to 20% of patients; blood in association with mucus and WCBs present in liquid of foul smelling stools; typhoidal-like syndrome, reactive arthritis may occur ; rare cases of febrile convulsions, Guillain-Barré syndrome and meningitis

EPIDEMIOLOGY: Important cause of diarrheal illness worldwide in all age groups (5-14% of diarrhea in world); common source outbreaks most often associated with foods, unpasteurized milk and unchlorinated water; largest number of sporadic cases in temperate climates occur in warmer months

HOST RANGE: Humans, animals and birds

INFECTIOUS DOSE: 500 organisms or less (by ingestion)

MODE OF TRANSMISSION: By ingestion of organisms in undercooked food or in unpasteurized milk or water; from contact with infected pets (puppies and kittens), farm animals or infected infants; possibly from cross-contamination from these sources to foods eaten uncooked or poorly refrigerated

INCUBATION PERIOD: 2-5 days, with a range of 1-10 days; dose-dependent

COMMUNICABILITY: Communicable throughout course of infection; individuals not treated with antibiotics excrete organisms for as long as 2-7 weeks; chronic carrier state is unusual

SECTION III - DISSEMINATION

RESERVOIR: Animals - swine, cattle, sheep, cats, dogs, other pets and rodents; birds, including poultry

ZOONOSIS: Yes - chronic carrier state established and animals constitute primary source of infection

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Sensitive to erythromycin, tetracyclines, fluoroquinolones and aminoglycosides

DRUG RESISTANCE: Single- and multiple-drug resistant strains have been reported

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol or isopropyl alcohol, 2% glutaraldehyde, iodines, phenolics, formaldehyde; commonly used disinfectants for drinking water treatment (0.1 mg/l of free chlorine, and 1 mg/l of monochloramine) are sufficient to kill *C. jejuni*

PHYSICAL INACTIVATION: Sensitive to moist heat (121°C for at least 15 min) and dry heat (160-170°C for at least 1 hour); highly sensitive to gamma irradiation and UV radiation

SURVIVAL OUTSIDE HOST: Will survive in moist environments (including droplets), especially at lower temperatures, but cannot tolerate drying; Feces - up to 9 days; milk - 3 days; glass slides - 24 hours; water - 2 to 5 days

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; confirmation by isolation from stool

FIRST AID/TREATMENT: Rehydration and electrolyte replacement; short antibiotic course for severe or prolonged illness

IMMUNIZATION: None

PROPHYLAXIS: Not usually administered

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 2 reported cases of laboratory-acquired infection

SOURCES/SPECIMENS: Feces, blood

PRIMARY HAZARDS: Ingestion, parenteral inoculation

SPECIAL HAZARDS: Infected laboratory animals

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices, containment equipment and facilities for activities with clinical materials known or potentially infected and cultures; animals biosafety level 2 facilities and practices

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

OTHER PRECAUTIONS: Good personal hygiene and frequent handwashing

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wearing protective clothing, gently cover spill with paper towels 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, incineration

STORAGE: In sealed containers that are appropriately labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: November 1999

Prepared by: Office of Laboratory Security, PHAC

Although the information, opinions and recommendations contained in this Material Safety Data Sheet are compiled from sources believed to be reliable, we accept no responsibility for the accuracy, sufficiency, or reliability or for any loss or injury resulting from the use of the information. Newly discovered hazards are frequent and this information may not be completely up to date.

Date Modified: 2011-02-18

Provide information on WHERE the cultures are stored, grown and used (BSL 2 room??), and by whom. What is the 'final use (of the bacteria) in the experiments'?

The work with live bacteria is done in Dr. Bend's Level 2 lab in SDRI. The bacteria is grown in the incubator in the Bend lab. We heat kill the bacteria in the water bath to 70 deg C and store them at -20 deg C at RRI. We study these bacteria using biochemical methods, like Elisa assay and Western blot.

The two personnel common to the three MODS are Thu Chau and Yadira Saldana. How does the collaboration work between these 3 investigators?

Thu will be doing all of the work. However, Yadira may do the work in the future which is why her name is on the modification. Yadira is co-supervised by Drs. Bend and Rieder. Mr. McCormick is on Yadira's advisory committee and is a collaborator on the project.

The source of all the additional strains is not given.

All of the Listeria strains are from ATCC. The E. coli 0157 is from DSMZ. See attached page for links.

The *Salmonella, Staphylococcus aureus* and *Streptococcus* came from the McCormick lab.

Why is the lab using hydrogen peroxide?

The lab is using a product called XLT which contains hydrogen peroxide. It is the same chemical that is used in the animal facilities. It is safer for surfaces than bleach. The biological safety cabinet is decontaminated using 70% ethanol.

Subject: LM and E.coli link
From: Thu Chau <tchau@robarts.ca>
Date: 11/6/2012 2:48 PM
To: Jennifer Stanley <jstanle2@uwo.ca>

Hello Jennifer,

Please see attached link. If you need more info. Please let me know.

http://www.dsmz.de/catalogues/details/culture/DSM-17076.html?tx_dsmzresources_pi5[returnPid]=329

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=19115&Template=bacteria

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=25400&Template=bacteria

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=35967&Template=bacteria

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=51742&Template=bacteria

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=49954&Template=bacteria

http://www.atcc.org/ATCCAdvancedCatalogSearch/ProductDetails/tabid/452/Default.aspx?ATCCNum=43550&Template=bacteria

All the best

Thu

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BACTERIA

How to read the following data (Example)

Name: ***Escherichia coli*** (Migula 1895) Castellani and Chalmers 1919

DSM No.: **17076**

Other collection no. or WDCM no.: NCTC 12900

Serotype: O157:H7

Isolated from: clinical specimen

Geographic origin: United Kingdom

History: <- NCTC

Cultivation conditions: Medium 381 , 37°C

Complete DSMZ Media List

Summary and additional information: <- NCTC. Clinical specimen; United Kingdom. Serotype O157:H7. Quality control strain for isolation media used for isolation and differentiation of serotype O157:H7 *E. coli*. Does not produce verotoxin. (Medium 381, 37°C).

Risk group: **2** (classification according to German TRBA)

Restrictions: Act dealing with the prevention & control of infectious diseases in man (Infektionsschutzgesetz), Category A1

Supplied as:
- vacuum dried culture
- actively growing culture available on request at an extra charge
- DNA

Prices:

Delivery form	Organization type	
	Profit	Non-Profit
Freeze Dried	65,- €	57,- €
Active culture on request	150,- €	150,- €
DNA	100,- €	100,- €

Freight and handling charges will be added. See price list.
Note: Freight charges for Risk Group 2 microorganisms will apply.

Other cultures: All DSMZ cultures of the species

Bacteria

ATCC® Number:	**19115™** Order this Item	Price:	**$60.00 (for-profit list price)** **$50.00 (non-profit list price)** **Log In with customer # to see your price**

Preceptrol® Culture

Organism:	*Listeria monocytogenes* (Murray et al.) Pirie
Designations:	Li 2
Isolation:	human
Depositor:	HP Seeliger
History:	ATCC <-- HP Seeliger <-- Preuss
Biosafety Level:	2
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 37°C **Atmosphere:** Aerobic
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Antigenic Properties:	serotype 4b
Cross References:	Nucleotide (GenBank) : A52868 Sequence 59 from Patent WO9624686. Nucleotide (GenBank) : A52869 Sequence 60 from Patent WO9624686. Nucleotide (GenBank) : A52870 Sequence 61 from Patent WO9624686. Nucleotide (GenBank) : X68420 L. monocytogenes gene for 23S rRNA.
Applications:	quality control strain
Related Products:	Purified DNA: ATCC 19115D-5
References:	6795: Seeliger HPR. Listeriosis, 2nd ed.. New York: Karger; 1961.

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ATCC® Number:	**25400™** Order this Item	Price:	**$354.00 (for-profit list price)** **$295.00 (non-profit list price)** **Log In with customer # to see your price**

Organism:	*Listeria grayi* Errebo Larsen and Seeliger emend. Rocourt et al.
Designations:	V-1 [NCTC 10815]
Isolation:	Standing corn leaves and stalks
Depositor:	HJ Welshimer
Biosafety Level:	1
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 37.0°C
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Applications:	Media testing
References:	5994: Welshimer HJ, Meredith AL. Listeria murrayi sp. n.: a nitrate-reducing mannitol-fermenting Listeria. Int. J. Syst. Bacteriol. 21: 3-7, 1971. 92283: Listeria species -- Biochemical Identification Method (MICRO-ID) Listeria). Gaithersburg, MD:AOAC International;AOAC "Official Methods of Analysis of the AOAC International" 992.18.

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ATCC® Number:	**35967™** Order this Item	Price:	**$222.00 (for-profit list price)** **$185.00 (non-profit list price)** **Log In with customer # to see your price**

Organism:	*Listeria seeligeri* Rocourt and Grimont
Designations:	CIP 100100 [1120, NCTC 11856, SLCC 3954]
Isolation:	soil, Germany
Depositor:	J Rocourt
History:	ATCC <-- J Rocourt <-- HPR Seeliger <-- J Weis 1120
Biosafety Level:	1
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 37°C **Atmosphere:** Aerobic
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Cross References:	Nucleotide (GenBank) : AX110994 Sequence 1727 from Patent WO0123604.
Type Strain:	yes(type strain)
Comments:	Avirulent
Applications:	media testing quality control strain quality control strain for API products
Related Products:	Purified DNA: ATCC 35967D-5
References:	8626: Rocourt J, Grimont PA. Listeria welshimeri sp. nov. and Listeria seeligeri sp. nov.. Int. J. Syst. Bacteriol. 33: 866-869, 1983. 10844: Ann. Microbiol. 134A: 359-364, 1983. 92283: Listeria species -- Biochemical Identification Method (MICRO-ID) Listeria). Gaithersburg, MD:AOAC International;AOAC "Official Methods of Analysis of the AOAC International" 992.18.

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ATCC® Number: **51742™** Order this Item

Price: **$60.00 (for-profit list price)**
$50.00 (non-profit list price)
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Product Information Sheet

Preceptrol® Culture

Organism:	*Listeria innocua* Seeliger
Designations:	DUP-104 [LCDC 81-861]
Isolation:	plant-derived foodstuff
Depositor:	E.I. du Pont
History:	ATCC <<--E.I. du Pont<<--LCDC 81-861
Biosafety Level:	1
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 30°C **Atmosphere:** Aerobic
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Applications:	Quality control for DuPont RiboPrinter [Reg TM] Microbial Characterization System
References:	16174178: RiboPrinter Pathogenic QC Set. DuPont Qualicon.

Bacteria

ATCC® Number:	**49954™** Order this Item	Price:	**$354.00 (for-profit list price)** **$295.00 (non-profit list price)** **Log In with customer # to see your price**

Organism:	*Listeria ivanovii* subsp. *londoniensis* Boerlin et al.
Designations:	CIP 103466 [CLIP 12229; CML 09/5081]
Isolation:	Food, France
Depositor:	C Bizet
History:	ATCC <<--C Bizet<<--J. Rocourt CLIP 12229 <<--- Dr. Espaze CNL 89/5081 <<--- Dr. Blanchard
Biosafety Level:	2
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 37.0°C
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Type Strain:	yes(type strain)
References:	6961: Boerlin P, et al. Listeria ivanovii subsp. londoniensis subsp. nov.. Int. J. Syst. Bacteriol. 42: 69-73, 1992.

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Bacteria

ATCC® Number: **43550™** Order this Item

Price: **$354.00 (for-profit list price)**
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Organism:	*Listeria welshimeri* Rocourt and Grimont
Designations:	SLCC 5877 [D-11]
Isolation:	Soil
Depositor:	HP Seeliger
Biosafety Level:	1
Shipped:	freeze-dried
Growth Conditions:	ATCC medium44: Brain heart infusion agar or brain heart infusion **Temperature:** 37.0°C
Permits/Forms:	In addition to the MTA mentioned above, other ATCC and/or regulatory permits may be required for the transfer of this ATCC material. Anyone purchasing ATCC material is ultimately responsible for obtaining the permits. Please click here for information regarding the specific requirements for shipment to your location.
Antigenic Properties:	Serovar 1/2b

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