

Biological Agent Reference Sheet (BARS)

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BIOLOGICAL AGENT REFERENCE SHEET

Salmonella enterica Spp. (Serotype Enteritidis, Typhi)

CHARACTERISTICS	
<i>Morphology</i>	Family <i>Enterobacteriaceae</i> . <i>S. enterica</i> is a facultative anaerobe, Gram-negative, non-motile rod that is 0.7-1.5 by 2.0-5.0 µm in size. <i>S. enterica</i> serotype Typhi (<i>Salmonella</i> Typhi) causes typhoid fever.
<i>Growth Conditions</i>	The most commonly used media selective for <i>Salmonella</i> are SS agar, bismuth sulfite agar, Hektoen enteric (HE) medium, brilliant green agar and xylose-lisine-deoxycholate (XLD) agar.

HEALTH HAZARDS	
<i>Host</i>	Humans are the only host for <i>Salmonella</i> Typhi. Domestic and wild animals host <i>S. enterica</i> non-typhoidal serotypes.
<i>Modes of Transmission</i>	<i>Salmonella</i> Typhi is transmitted by consumption of contaminated food or water, contact with infected feces, person-to-person contact, or direct contact with infected animals.
<i>Signs and Symptoms</i>	The most common symptoms include sustained fever, abdominal cramps, and headache. Occasionally, patients have a rash of flat rose-colored spots. Individuals may carry <i>Salmonella</i> Typhi after symptoms have disappeared, thus the illness may return or it may be passed on to other people.
<i>Infectious Dose</i>	<103 rods of <i>Salmonella</i> Typhi
<i>Incubation Period</i>	Usually 12 to 72 hours, but it can last for up to six weeks depending on the inoculation dose.

MEDICAL PRECAUTIONS / TREATMENT	
<i>Prophylaxis</i>	Clean water supplies, hand hygiene, sanitation, avoid eating raw eggs or unpasteurized milk.
<i>Vaccines</i>	Two types of vaccines are available for <i>Salmonella</i> Typhi. Vaccination is recommended for laboratory workers who work with this microorganism.
<i>Treatment</i>	Typhoid fever is treated with antibiotics. Individuals who do not receive treatment may continue to have fever for weeks or months, and as many as 20% may die for complications of the infection.
<i>Surveillance</i>	Monitor for symptoms. Laboratory confirmation is done via isolation from stool or blood and by molecular analysis to identify the serotype.
<i>Emory Requirements</i>	Report all incidents. Provide information to the Biosafety Office regarding potential CDC and/or USDA permit.

LABORATORY HAZARDS	
<i>Laboratory Acquired Infections (LAIs)</i>	<i>Salmonella</i> Typhi frequently causes LAIs. Lab-acquired infections with <i>Salmonella</i> Typhi present with symptoms of septicemia, headache, abdominal pain and fever.
<i>Sources</i>	Ingestion is the most frequent route followed by parenteral inoculation. Transmission outside the laboratory has been reported. Aerosol transmission may be possible.

SUPPLEMENTAL REFERENCES	
<i>Canadian PHAC</i>	http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/salmonella-ent-eng.php
<i>CDC</i>	https://www.cdc.gov/typhoid-fever/sources.html http://www.cdc.gov/salmonella/ https://www.cdc.gov/biosafety/publications/bmbI5/

CONTAINMENT	
<i>BSL2/ABSL2</i>	All work with <i>Salmonella</i> -infected samples or propagation of the bacteria must be conducted inside a Biological Safety Cabinet (BSC) Class II. Use face shield, surgical mask and eye protection for open bench work. Hand washing procedures must be carefully followed. Animal work should be conducted in the BSC. Risk assessment will be needed for procedures generating aerosols.

SPILL PROCEDURES	
<i>Small</i>	Notify others working in the lab. Allow aerosols to settle. Don appropriate PPE. Cover area of the spill with paper towels and apply an EPA-registered disinfectant, working from the perimeter towards the center. Allow 30 minutes of contact time before disposal and cleanup of spill materials.
<i>Large</i>	For assistance, contact Emory's Biosafety Officer (404-727-8863), or the EHSO Spill Team (404-727-2888)

EXPOSURE PROCEDURES		
<i>Mucous membrane</i>	Flush eyes, mouth or nose for 15 minutes at eyewash station.	
<i>Other Exposure</i>	Wash area with soap and water for 15 minutes.	
<i>Reporting</i>	Immediately report incident to supervisor, complete an employee incident report in PeopleSoft	
<i>Medical Follow-up</i>	<i>7am-4pm (OIM):</i> EUH (404-686-7941) EUHM (404-686-7106) WW (404-728-6431)	<i>After Hours:</i> OIM NP On Call 404-686-5500 PIC# 50464
	<i>Needle Stick (OIM):</i> EUH (404-686-8587) EUHM (404-686-2352)	<i>Yerkes:</i> Maureen Thompson Office (404-727-8012) Cell (404-275-0963)

VIABILITY	
<i>Disinfection</i>	<i>Salmonella</i> Typhi is susceptible to 1% sodium hypochlorite, 70% ethanol, 3-6% hydrogen peroxide, and quaternary ammonium compounds.
<i>Inactivation</i>	Sensitive to moist heat (121 °C for at least 15 minutes), dry heat (170 °C for at least 1 hour) and ozone.
<i>Survival Outside Host</i>	Lettuce (63 days); parsley (231 days); pecans (32 weeks); refrigerated cheddar cheese (10 months); butter (9 months); frozen yogurt (63 days); frozen minced beef and chicken (20 weeks).

PERSONAL PROTECTIVE EQUIPMENT (PPE)	
<i>Minimum PPE Requirements</i>	At minimum, personnel are required to don gloves, closed toed shoes, lab coat, and appropriate face and eye protection prior to working with <i>Salmonella</i> Typhi. Additional PPE may be required depending on lab specific SOPs.
<i>Additional Precautions</i>	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.