

Section 1 - Infectious Agent

Agent Name: *Bacillus subtilis*

Agent Type: Bacteria

Taxonomy:

Family: Bacillaceae

Genus: *Bacillus*

Species: *B. subtilis*

Subspecies/Strain/Clonal Isolate:

Synonym/Cross Reference

Hay bacillus; grass bacillus

Characteristics

Brief Description: *Bacillus subtilis* is a Gram-positive bacterium, heavily flagellated, rod-shaped and catalase-positive. Typically rod shaped and are about 4-10 micrometers (μm) long and 0.25–1.0 μm in diameter, with a cell volume of about 4.6 fL at stationary phase.

Properties: *B. subtilis* has historically been classified as an obligate aerobe, though evidence exists that it is a facultative anaerobe and can form a tough, protective endospore, allowing it to tolerate extreme environmental conditions.

Section 2 - Hazard Identification

Pathogenicity/Toxicity

While the pathogenic potential of *B. subtilis* is considered absent or low, there are cases of septicemia in immunocompromised patients. *B. subtilis* has also been implicated in food-borne illness with vomiting the most common symptom.

Predisposing Factors: Immunocompromised patients with regard to septicemia and very high bacterial loads (10^5 - 10^9 c.f.u./g) with regard to food borne illness.

Communicability

Outline the various ways in which the infectious agent can be transmitted from one host to another: ingestion, injection (including vectors), mucous membrane/skin contact (or genitourinary), inhalation (airborne or aerosols). What is the likelihood of transmission by direct (intimate, casual) or indirect (fomites, vectors) contact? Is the same true for humans and animals? What is the preferred mode of transmission (e.g., influenza viruses typically are transmitted by inhalation of infectious aerosols)?

Epidemiology

World-wide distribution. Commonly found in the upper layers of the soil and is a normal gut commensal in humans.

Host Range

Natural Host(s): Humans

Other Host(s): List other hosts, including experimentally infected hosts, if applicable.

Infectious Dose

Unknown.

Incubation Period

Food borne illness incubation period from 10 min to 14h; median 2.5h.

Section 3 - Dissemination

<p>Reservoir Soils and the human gut</p>
<p>Vectors None.</p>
<p>Zoonosis / Reverse Zoonosis None.</p>
<p>Section 4 - Dissemination</p>
<p>Drug Susceptibility Bacillus species are normally susceptible to clindamycin, erythromycin, chloramphenicol, vancomycin and the aminoglycosides. They are also usually susceptible to tetracycline and sulfonamides.</p>
<p>Drug Resistance Some strains of B. subtilis demonstrate resistance to penicillin, erythromycin, rifampin, and novobiocin.</p>
<p>Susceptibility to Disinfectants Gram positive bacteria are generally susceptible to a number of disinfectants, including phenolic compounds, hypochlorites (1% sodium hypochlorite), alcohols (70% ethanol), formaldehyde (18.5 g/L; 5% formalin in water), glutaraldehyde, iodines (0.075 g/L).</p>
<p>Physical Inactivation Bacteria are generally sensitive to moist heat and dry heat(8) . Growth of micrococci may be significantly reduced at temperatures >45 °C, pH <6, and in high salt concentrations (>15%).</p>
<p>Survival Outside Host Soil-borne organism</p>
<p>Section 5 - First Aid and Medical</p>
<p>Surveillance How can the pathogen be detected/diagnosed in an infected individual? What are the symptoms to look for? Based on the medical surveillance program, what are the recommendations for surveillance? Is it important that the surveillance plan include establishing a history of contact with animals or international travel in infected individuals?</p>
<p>First Aid / Treatment How can the infection/disease be treated in an infected individual? Is treatment typically undertaken for infected animals? Based on the medical surveillance program and post-exposure response plan, what specific first aid/treatment is recommended?</p>
<p>Immunization Not applicable</p>
<p>Prophylaxis Not applicable</p>
<p>Section 6 - Laboratory Hazards</p>
<p>Laboratory Acquired Infections None reported.</p>

Sources / Specimens

What are the primary biological samples and specimens likely to contain the infectious agent (e.g., blood, urine, semen, mucous, faeces, necropsy tissues)?

Primary Hazards

None.

Special Hazards

None.

Section 7 - Exposure Controls and Personal Protection**Risk Group Classification**

What is the Risk Group classification in humans and animals for the pathogen?

Human Risk Group Classification RG1 Animal Risk Group Classification RG1

Containment Requirements

Containment Level: CL1

Containment Zone Requirements:

Containment Level 1 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.

Section 8 - Handling and Storage**Spills**

Allow aerosols to settle. Wearing protective clothing, gently cover the spill with absorbent paper towel and apply suitable 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 appropriately labelled leak-proof containers in a locked area. Containers of infectious material or toxins stored outside the containment zone must be labelled, leakproof, impact resistant, and kept either in locked storage equipment or within an area with limited access.

Section 9 - 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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References

Risk Group determination from "PHAC Biological Agent Search".

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