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# Beta-Haemolytic Streptococci
(BHS)

## Classification
Gram-positive cocci, often found in chains

## Family
Streptococcaceae

β-haemolytic streptococci are characterized by Lancefield grouping (a characterization based on carbohydrates in the cell walls). Only some Lancefield groups are of clinical importance in laboratory rodents. Streptococci are generally referred to by their Lancefield grouping but genus and species are occasionally used.

Group A: *Streptococcus pyogenes*
Group B: *Streptococcus agalactiae*
Group C: *Streptococcus equi* subsp. *zooepidemicus*
Group G: *Streptococcus canis*

## Affected species
β-haemolytic streptococci are generally considered opportunists that can colonize most species. Mice and guinea pigs are reported most frequently with clinical signs, although many rodent colonies are colonized with no morbidity, suggesting disease occurs only with severe stress or in other exceptional circumstances. Therefore, these bacteria are considered low-grade opportunists of immunocompetent rodents, but would be undesirable flora in immunodeficient or immunocompromised animals. Groups A and B streptococci are considered pathogenic in humans, although there are many asymptomatic human carriers; human carriers are generally the sources for infection of other humans. Theoretically, BHS are zoonotic, but no reports of infection from laboratory rodents can be found. Most streptococcal colonization of animal colonies appears to be from human carriers.

## Frequency
Variable; from none in isolator-reared colonies to common in some barrier colonies. Group C streptococci are excluded from well-managed guinea pig colonies, but found in some pet guinea pigs. Prevalence of BHS in wild populations of rodents is unknown.

## Transmission
Transmission is generally via direct contact with nasopharyngeal secretions from ill or carrier animals. Animals may also be infected by exposure to ill or carrier caretakers.

## Clinical Signs and Lesions
In mice and rats, generally none. Occasional outbreaks of disease associated with BHS are reported anecdotally and in the literature. In most cases described, animals became systemically ill after experimental manipulation, and other animals in the colony were found to be asymptomatic carriers. In a case report not involving experimental manipulation, DBA/2NTac mice and their hybrids were more susceptible to an ascending pyelonephritis and subsequent systemic disease induced by Group B streptococci than other strains housed in the same barrier.

In guinea pigs, infection with Group C streptococci leads to swelling and infection of the lymph nodes. Guinea pigs can be inapparent carriers of the organism in their conjunctiva and nasopharynx. Once the bacteria gains entry to the body, often through an abrasion, it spreads to the regional lymph nodes. Proliferation of the organism within the lymph node produces chronic suppurative changes. An acute systemic disease associated with Group C streptococci has also been described in guinea pigs. This form of the infection has only been described in young guinea pigs; animals with this form of the disease have a fibrinopurulent pleuritis and bronchopneumonia.

## Diagnosis
Diagnosis of a BHS infection should only be made in association with clinical signs or lesions. The isolation of the bacterium from otherwise healthy mice or rats is not a cause for alarm. Group C streptococci in guinea pigs is usually diagnosed via the typical clinical signs and isolation of characteristic streptococci from the purulent lymph nodes.

# **technical** sheet

## Interference with Research

In mice and rats, there is no known interference with research associated with the carrier state. Laboratories working with animals that will become immunosuppressed or undergo significant surgical alteration as part of experimental protocols may wish to have animals free of BHS. Animals that have become clinically ill are not suitable for use in research. In guinea pigs with Group C streptococci, animals almost always become clinically ill, so animals carrying this organism are not suitable for use in research.

## Prevention and Treatment

To prevent transmission of BHS to animals, the animals must be raised in strict bioexclusion housing, such as would be necessary for immunodeficient mice. As rodent BHS probably originates from humans, animal care workers should use a HEPA-filtered respirator or N95 mask. Caretakers with “strep throat” or other streptococcal infections should not work with animals until a course of antibiotics has been completed. Normal animal work precautions will keep humans from acquiring BHS from animals.

BHS are susceptible to most common disinfectants used in animal facilities. Any chemical or mechanical sterilant will also serve to remove BHS from the environment. Treatment of animals with antimicrobials may serve to treat illness, but rarely, if ever, resolves the carrier state, nor will antibiotic treatment eliminate bacteria from the bedding or cage surfaces. Thus, treatment is only recommended to ameliorate clinical signs. To obtain a BHS-free colony, animals should be rederived through embryo transfer or hysterectomy into/onto BHS-free dams.

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