Exposure Response Plan for the Laboratory Handling of *S. pneumoniae*

**Background Information**

*Streptococcus pneumonia* (*S. pneumoniae, Strep pneumo*) is gram-positive, alpha-hemolytic, bile-soluble, facultative anaerobic member of the genus *Streptococcus*. The encapsulated, Gram-positive coccoid bacteria have a distinctive morphology on Gram stain, the so-called, "lancet-shaped" diplococci. They have a polysaccharide capsule that acts as a virulence factor for the organism; more than 90 different serotypes are known, and these types differ in virulence, prevalence, and extent of drug resistance. *S. pneumoniae* is part of the normal upper respiratory tract flora, but, as with many natural flora, it can become pathogenic under the right conditions (e.g., if the immune system of the host is suppressed, or if innate immune barriers are breached). Invasins, such as pneumolysin, an antiphagocytic capsule, various adhesins and immunogenic cell wall components are all major virulence factors.

*Exposure Incident*: Laboratory acquired infections (LAIs) of this species are among the most common lab infections. A small number of deaths prior to 1976 were reported.

*Reporting Exposure Incidents*: Report all exposures to the Principal Investigator/lab supervisor and seek immediate medical evaluation. If help is needed with injuries or clean up, members of the University will contact the police at 6-6911 and members of the Medical Center will contact Security at 6-5100. Whenever there is an accident involving *Strep pneumo*, the Biosafety Officer must be notified.

**Pre-exposure Health Screening:**

All employees will receive training on the risks of working with *S. pneumoniae* and symptoms of exposure by the PI or Occupational Health Professional prior to beginning work with or around this agent. If the worker is using strain(s) with capsular antigens included in the vaccine, s/he should be seen by the Occupational Health Professional prior to use of agent, to discuss risks/benefits of vaccination and be vaccinated if indicated. Immunocompromised persons should inform Occ Health of their immune status.

*Before an Exposure Incident Occurs:*

There are two different vaccines; one mainly for adults and one only for children. The adult vaccine has been available for many years and is known as the pneumococcal polysaccharide vaccine (PPSV23). The Occupation Healthcare Provider may wish to know specific information on the strain’s capsule in order to determine the risk/benefit ratio. There is little benefit if a non-encapsulated *Strep pneumo* strain is used. It is also useful to know if you have been previously vaccinated as systemic reactions are possible with a second dose. If a second dose is given, it should be 5 years after the first dose.
The child’s vaccine is referred to as the pneumococcal conjugate vaccine. The current vaccine (PCV13) protects against 13 of the more severe pneumococcal infections and replaces that which protected against seven types.

**After an Exposure Incident Occurs: Immediate Action by Route of Exposure**

**Needlestick, Animal Bite or Laceration:** Wash the area with soap and running water.

*Mucous membranes (nose, mouth):* If contaminated material is splashed or sprayed contaminating the nose or mouth: Rinse mouth out with clean water. Do not swallow. Wash the face being sure that the nasal cavities have been rinsed as much as possible.

*Inhalation:* If contaminated materials are aerosolized outside of primary containment and potentially inhaled, rinse mouth twice expelling the rinsate. Do not swallow.

*Contact with freshly soiled clothing:* Remove contaminated clothing using gloves and place in autoclave bags. Clothing is autoclaved and then laundered. Wash contaminated skin with soap and water.

**After an exposure incident occurs: medical evaluation and follow-up:**

Following immediate post exposure actions, contact the Tufts MC Employee Health Clinic (Boston), TCSVM Occupational Medical Clinic (Grafton) or the Mt. Auburn Occupational Health Services (Medford) and arrange for medical evaluation, diagnosis and treatment if needed.

During this medical evaluation, the exposed individual may be asked to provide a blood sample, may be educated on the signs or symptoms of pneumonia, and instructed to watch for the development of these signs and symptoms.

**Signs and Symptoms of *S. pneumoniae* vary according to infection site.**

Symptoms typically begin suddenly one to three days after exposure, and may include:

- shaking chills/fever
- productive cough
- shortness of breath
- headache,
- chest/ear pain
- malaise
- muscle aches
Illness may last for a week or two. Mortality rate is affected by penicillin resistance. People can be colonized in the nose, throat or skin without symptoms or illness.

**Post-exposure prophylaxis:**

There is currently no post exposure pre-symptom prophylaxis for pneumonia.

If any individual working with or around *S. pneumoniae* develops signs or symptoms suggestive of exposure to *S. pneumoniae*, they must inform their PI and Biosafety Officer immediately. Signs and symptoms usually develop within days of exposure. The individual is communicable for 24-48 hours after starting antibiotics. The individual must be evaluated at Tufts MC Employee Health (Boston), must notify the TCSVM Occupational Health Nurse who will refer the individual to an Infectious Disease specialist (Grafton), or a physician at Mt. Auburn Hospital Occupational Health Group (Medford).

Massachusetts Department of Public Health classifies invasive pneumococcal disease as a reportable disease. In accordance with Massachusetts regulation, any clinical laboratory identifying an invasive or penicillin resistant infection caused by *S. pneumoniae* may report to the Massachusetts Department of Public Health in accordance with disease-reporting regulations.

If an employee develops signs and symptoms associated with *S. pneumoniae* exposure in the absence of an exposure incident, the PI and Biosafety Officer shall be notified immediately. Due to the fact that this bacterium causes most cases of community acquired bacterial, it is not reasonable to assume the infection is laboratory-acquired until proven otherwise.