

Emergence of burkholderia pseudomallei biology essay

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Meet Burkholderia Pseudomallei a native bacterium in northern Australia which lives in water and soil, highly versatile managing to colonise basically everything. When it cause humans there is a disease called melioidosis. B Pseudomallei is capable of causing pyogenic or granulomatous infection in virtually any tissue. Infection in most cases is presumably acquired either by direct inoculation, inhalation or ingestion (1). The bacterium is a soil saprophyte, often present in wet soils and rice paddies in Southeast Asia. The disease Melioidosis occurs after the organism contaminates superficial breaks in the skin or via inhalation. B Pseudomallei is classified as type category B bioterrorism agents by the centres for Disease Control and Prevention (CDC) (3). In a recent study of 252 cases of melioidosis in northern Australia, Currie et al reported that 80% of affected individuals had an identifiable risk factor predisposing to infection; 27% of cases had chronic lung disease, a risk factor not previously identified, and 85% presented between December and February which is classed as the wet (cyclone) season in tropical Australia (1). The risks are not over yet; O'Carroll et al published four B. Pseudomallei infection in four subjects with Cystic fibrosis (CF). The first two single case reports involved travellers visiting Thailand from Europe and both had pulmonary exacerbations soon after presumed acquisition. There was a significant delay (6 years in one case) in identification of the organism. Both patients had chronic infection with B Pseudomallei. A third case of melioidosis in a patient with CF was reported in a research letter describing imported melioidosis in England and Wales but clinical details were limited. The last case from New Zealand described four CF patients (three children and one adult) who acquired B Pseudomallei

infection after the exposure in northern Australia, a region of endemicity. *B. Pseudomallei* may therefore be an emerging problem in CF and represent an important pathogen, not only in travellers to endemic regions but also to those patients with CF living in tropical climates. The adult CF unit at the Prince Charles hospital in Brisbane provide care to the majority of adults with CF in the state of Queensland, the northern part of which is tropical and endemic for *B. Pseudomallei* reside (1). Figure 1. The mortality rate of approximately 40% and death occurs 24-48 hours following the onset of symptoms. Abscess formation in the lungs, liver, spleen and skeletal muscle are the hallmarks of infection. Impairment of the immune system, diabetes, alcoholism, renal disease, malignancies, steroid therapy and CF are all risk factors for melioidosis (3). Identifying the Bacteria

Bacteriology All isolates for the identification of *B. Pseudomallei* were obtained from sputum that was collected and routinely cultured on the following media: Macconkey agar, sheep blood agar, chocolate agar + bacitracin, cepacia agar and mannitol salt agar. Phenotypic identification of *B. Pseudomallei* was based on biochemical reactions where a positive oxidative test and the API 20NE; which is a classification of bacteria based on the biochemical reaction, allowing fast identification (1). Sensitivity to Antibiotics This testing is done to choose which antibiotic is most effective against this bacterium. According to O'Carroll et al the SXT sensitivities were confirmed using E test according to the NCCLS broth dilution break points. The following antibiotics (disc concentration) were tested: tetracycline (30µg/ml), gentamicin (10µg/ml), sulphamethoxazole/ trimetoprim (SXT) (25µg/ml), meropenem (10µg/ml), imipenem (10µg/ml), colistin sulphate (10µg/ml) and ciprofloxacin (5µg/ml).

(1). Serum Testing A serological test is conducted for diagnostic purposes where an infection is suspected, this helps in detecting the presence of antibodies against a microorganism. Antibodies for B Pseudomallei antibodies were measured in each patient using the blood samples collected, after the first identification of B Pseudomallei in sputum. Total antibody titres were measured using an indirect haemoagglutination assay and IgM and IgG subclasses were measured using an enzyme linked immuno assay. (1).

Resistance of the Bacterium Bacteriology Each isolate of sputum collected induced a pink colouration when grown on MAST B cepacia medium. Each isolate was identified as B Pseudomallei based on the API20NE with cases indicated 1, 2 and 4 sharing the same profile (99. 8% B Pseudomallei).

(1) Sensitivity to Antibiotics All the isolates of sputum collected were resistant to all classes of amino glycosides and colistin. Three of the four isolates were sensitive to tetracycline and SXT, but only one was sensitive to ciprofloxacin.

(1) Serum test All patients had positive serum B Pseudomallei antibodies which were performed after the initial identification of B Pseudomallei in sputum, Moreover all cases had positive B Pseudomallei total antibody and IgG antibodies. (1) Public Warning Most cases of infection with B Pseudomallei are presumed to occur via direct inoculation and contaminated soil or water.

B Pseudomallei is an important pathogen in people living in endemic areas mainly in northern Australia and Southeast Asia. Identification of B Pseudomallei has proven to be difficult. (2) Even in CF microbiology B Pseudomallei can be mistaken for B Cepacia when using commercially identification systems. Public health is of greater risk at a time when subjects with CF are undertaking international travel more that ever before, Moreover

B Pseudomallei is emerging as a significant pathogen for those holidaying in the tropics. Recent reports suggest that measurements should be taken to avoid soil and exposure to fresh water supplies such as swimming lagoons when visiting endemic areas, particularly in the wet season (1).