Natural History of *Bacillus anthracis* Ames in Cynomolgus Macaques Following Inhalation Challenge

L.E. Bowen, J.E. Trombley, J.A. Boydstun, J.K. Bohannon, J.S. Toomey, J.F. Mann, and Z.N. Llewellyn

Southern Research Institute 2009 Ninth Avenue South • Birmingham, AL 35205

Abstract

Background

The use of *Bacillus anthracis* Ames (BAA) in a neomouse has demonstrated the continued research of bioterrorism agents. Understanding the pathogenesis of inhalation anthrax in animal models will facilitate this research. The purpose of this study was to evaluate the natural history of inhalation anthrax in cynomolgus macaques following intranasal exposure of anaerobic BAA aerosols.

Methods

Three groups of cynomolgus macaques were challenged with target aerosol doses of 23, 199, and 497 LLDs using a novel aerosol inhalation exposure system. Blood was collected daily for histopathology, clinical chemistry, and hematological analyses. Various tissue samples, including lung, liver, spleen, lymph nodes, and brain, were collected at necropsy for macroscopic and microscopic pathological evaluation.

Results

Individual body weight across groups is presented in Figure 2. Animal weights were higher for INPs in Group 1 than in Group 2 and Group 3 (p < 0.0001). There were no significant differences in weight loss observed between male and female INPs.

Body Temperature

Individually group body temperature data is presented in Figure 3. Body temperatures were higher in Group 1 and Group 2 INPs than Group 3 INPs. There were no significant differences in body temperatures between Group 1 and Group 2. Overall, body temperature for male INPs was higher than for female INPs (p < 0.0001).

Microscopic Histopathology

Microscopic lesions consistent with BAA inhalation were observed in various organs of the INPs but were most frequently observed in the lymph nodes, spleen, brain, and kidneys. These lesions consisted of necrosis, hemoraggia, abscess, inflammation, hemorrhaging, ulceration, congestion, and the presence of red-stained bacteria. Microscopic photographs of these lesions generated from histology and necrotically affected organs are presented in Figure 5 (below).

Conclusions

The results of this study are consistent with previous studies of BAA inhalation. Lesions were observed in the lymph nodes, spleen, lung, liver, brain, and kidneys in INPs exposed to aerosolized BAA. The results of this study are consistent with previous studies of BAA inhalation. Lesions were observed in the lymph nodes, spleen, lung, liver, brain, and kidneys in INPs exposed to aerosolized BAA.

References


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