Incorporating Time Post Inoculation into a Dose Response Model of *Y. pestis* in Mice

Yin Huang, Charles N. Haas
Drexel University
Department of Civil, Architectral and Environmental Engineering
Center for Advancing Microbial Risk Assessment (CAMRA)

Project Scope:
The work presented in this poster is a component of a greater effort to develop human dose-response data for pathogenic organisms and present this information in the scientific literature and the general public. Dose-response data in the technical literature are generally from animal experimental studies or from epidemiological studies. Thus a significant thrust of this project is use of such data to develop estimates of microbial risk for human populations. To date, data have been collected for all category A bioterror agents, many category B agents and other agents of concern such as *Vibrio cholera* and *Mycobacterium tuberculosis*. Future work will focus on incorporation of microbial kinetics, epidemiological data and other data and techniques for developing dose response models for pathogens with limited or no experimental dose-response data.
Recent Progress:
A new dose response model incorporating dependence of response on time post inoculation (TPI) was developed and validated. The new dose response model was fitted via maximum likelihood estimation (MLE) to a data set of mice response to intraperitoneal exposure to a virulent strain of *Yersinia pestis*. The new dose response model provided a statistically-significant improvement in fit over the best fit of the data with traditional dose response models (exponential, beta-Poisson and log-Probit) without TPI dependence. After validation, the new dose-response model will be useful for quantifying the effects of TPI on dose response of *Y. pestis* in mice, and consequently better describing the observed data. This is the first study that includes the factor of time post inoculation into the dose response model for *Y. pestis* infection.
Future Plans:
To develop advanced dose response model including TPI dependency for other organisms
Relevance to listed research areas:
Biological Threats & Countermeasures and Risk and Decision Sciences
Previous Publications:
Bartrand, T.A., Haas C.N., Weir, M.H. (2008). "Dose-Response Models for Inhalation of Bacillus anthracis Spores: Interspecies Comparisons." Risk Analysis. Accepted for Publication.
Weir, M.H., Haas C.N. "Quantification of the Effects of Age on Dose Response of Variola major in Suckling Mice." Risk Analysis. Currently under Review.
Tamrakar, S., Haas C.N. (2008) "Dose Response Model for Lassa Virus." International Journal of Human Ecology & Risk Assessment. Accepted for Publication.

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