A hierarchical model for probabilistic dose-response assessment of Bacillus anthracis
by Jade Mitchell-Blackwood, Patrick L. Gurian, PhD and Mark Weir
Department of Civil Architectural, and Environmental Engineering, Drexel University, Philadelphia, Pennsylvania 19104

Methods

Bayesian Hierarchical Modeling
- Markov Chain Monte Carlo (MCMC) techniques were used to estimate posterior distributions of parameters of dose response model parameters for three different species: rabbits, guinea pigs, and monkeys.
- Mean, median and credible intervals were calculated for each group using maximum likelihood estimation (MLE) and Bayesian hierarchical models.

Data

- Exponential Dose Response: $P(d) = 1 - e^{-rd}$
- $\sigma$ = pathogen-host survival probability
- $\phi$ = pathogen-host transmission probability
- $d$ = dose of organism to host

Results

A comparison of the results produced using the traditional exponential model and the Bayesian hierarchical model shows similar results for the susceptibility of guinea pigs and ATCC 6503 guinea pigs.

Future work

- Future research should be conducted to further understand the underlying mechanisms of disease progression and to refine the model for better predictions.

Literature cited


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For further information

Please contact Jade Mitchell-Blackwood at jade.blackwood@du.edu for more information on the related project.