

Dose Response Model for *Burkholderia pseudomallei*

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Burkholderia pseudomallei

- Flagellated gram negative saprophyte.
- Causative agent of Melioidosis.
- Diabetic population are high risk group (6).
- Found in tropical region, e.g. South East Asia, Northern Australia.
- Category B agent (5).

Model used

$$P(d) = 1 - e^{-kd}$$

Exponential

$$P(d) = 1 - \left[1 + \left(\frac{d}{N_0} \right)^{\alpha} \right]^{-\beta}$$

Beta Poisson

$$P(d) = \frac{1}{q_1} \ln \left(\frac{d}{q_1} \right)$$

Data and Methods

- Data from open literature.
- Cochran-Armitage test for trend.
- Dose-response relationships were fit to data using MLE.
- Difference in deviances (D)
- Compared to c2 at 1
- Ho: simpler model is best fit
- Low dose extrapolation from best fit model.
- Comparison of responses in different hosts.

Acknowledgement

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Table 1: Data used

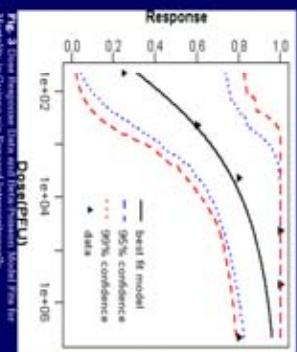
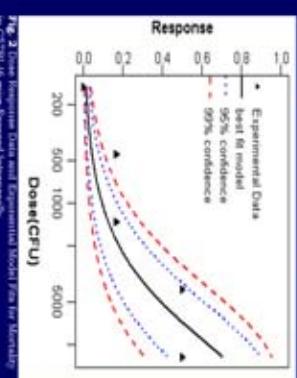
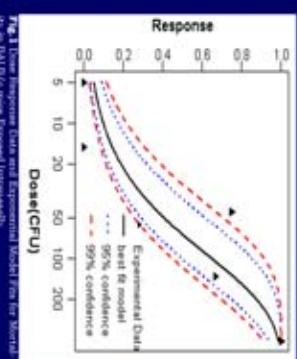
Host Animal	No. of Inf.	Inf. (%)	Proportion	negative
BALB/c mice	11	11.0	0.11	0.89
C57BL/6 mice	11	11.0	0.11	0.89
Diabetic rats	10	10.0	0.10	0.90
Normal rats	10	10.0	0.10	0.90

Table 2: Best Fit Models

Host	No. of Doses	Minimum Dose	Best fit Model	Parameters
BALB/c mice	3	8.25	Exponential	k=0.0148
C57BL/6 mice	3	3.54	Exponential	k=0.001004
Diabetic rats	4	3.87	Diabetic rats	k=0.016000

Table 3: Comparative susceptibilities

Dose (CFU)	BALB/c mice	Response	Diabetic rats	Response
1.0	0.0008	0.000	0.0008	0.000
10	0.0002	0.000	0.1000	0.000
100	0.00002	0.000	0.00002	0.000



Conclusions

- BALB/c mice are most susceptible among the host animals.
- Diabetic rats are more susceptible (15 times more at a dose of 1 CFU and 11 times at 100 CFU) than C57BL/6 mice (Ref. to Table 3 & Fig. 5).
- Diabetic population is more susceptible than nondiabetic (reason may be the innate immunity of diabetic person is suppressed especially the neutrophil function).
- At low doses, BALB/c mice need 10 times less pathogens (exposed i.n.) than diabetic rats (i.p.) and C57BL/6 mice need 10 times more organ-

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