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MEMORANDUM

SUBJECT: Benchmark dose analysis of brain and RBC data from the malathion comparative cholinesterase study in juvenile and adult rats (MRID no. 45566201)

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A benchmark dose analysis of red blood cell (RBC) and brain cholinesterase (ChE) data from the malathion comparative sensitivity study evaluating juvenile and adult rats (MRID no. 45566201) was performed. The results of this analysis are provided below.

1. Introduction:

Malathion (O,O-dimethyl thiophosphate of diethyl mercaptosuccinate) is an organophosphorus insecticide whose primary mode of toxic action is the inhibition of acetylcholinesterase (AChE). Malathion is metabolically converted *in vivo* to malaoxon, the active cholinesterase (ChE)-inhibiting chemical. A study evaluating the comparative sensitivity between juvenile and adult rats is available for malathion (MRID no. 45566201). The purpose of this memo is to provide the results of a benchmark dose (BMD) analysis performed on the red blood cell (RBC) and brain cholinesterase (ChE) data from this study.

2. Methods:

In the present analysis, BMD modeling has been used to estimate BMD_{10} and $BMDL_{10}$ for the RBC and brain ChE data provided in the malathion comparative sensitivity study in juvenile and adult rats. The BMD_{10} is the estimated benchmark dose expected to result in 10% inhibition of ChE. The BMDL is the lower 95% confidence interval on the BMD_{10} . The BMD_{10} was selected because it is generally at or near the limit of sensitivity for discerning a statistically significant decrease in ChE activity across the blood and brain compartments and is a response level close to the background ChE. For purposes of evaluating relative sensitivity between juvenile and adult animals, the central estimate (i.e., BMD_{10}) is the appropriate value. However, when a BMD estimate is used as the point of departure (PoD) for risk estimation, the Agency's draft guidance on use of benchmark dose (USEPA, 2000) specifies that the **BMDL, and not the BMD, should be used.**

An electronic spreadsheet containing the following information was compiled: study type, duration of exposure, number of animals per dose group, species/strain/sex, compartment, and the measured effect for each dose group (mean RBC and brain ChE activity, activity units, and standard deviation). This spreadsheet is provided as Appendix 1.

BMD_{10} s and $BMDL_{10}$ s were estimated by fitting the ChE data to the dose-response model (exponential model) given in the Equation 1 (below) using generalized nonlinear least squares (GNLS). The exponential model was used in the Preliminary OP Cumulative Risk Assessment (USEPA, 2001a) to determine relative potency factors and points of departure. The exponential model and statistical methods used to calculate the BMD_{10} s and $BMDL_{10}$ s have been supported by the FIFRA Science Advisory Panel (FIFRA, 2002). Technical description of the statistical methods can be found in the cumulative hazard

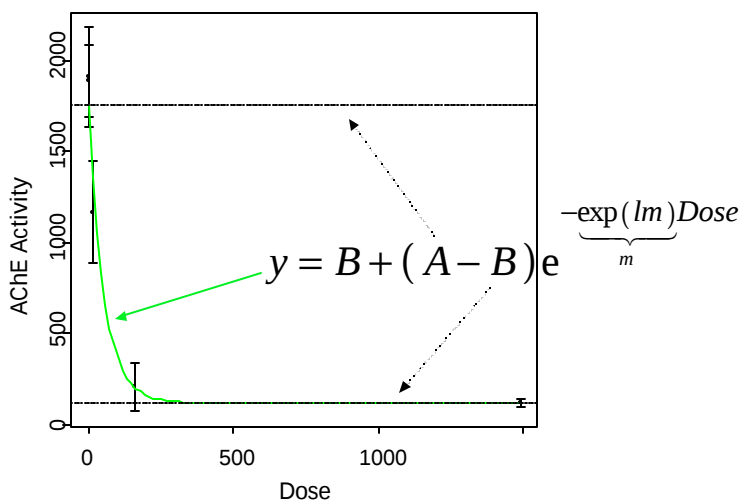
assessment of the Preliminary OP Cumulative Risk Assessment (USEPA, 2001a).

The exponential function used for modeling the effect of the OPs on ChE activity was:

$$y = B + (A - B) \times e^{-m \times \text{dose}} \quad \text{Equation 1}$$

where **y** is ChE activity extracted from MRID no. 45646401,
dose is the dose of OP, in mg/kg/day,
m is the dose scale factor,
A is background ChE activity,
and **B** is the y-asymptote.

Equation 1 reflects the observation that ChE activity decreases to a limiting value (**B**) as dose increases. The model has three parameters to be estimated: *m* (dose scale factor), *A* (background), and *B* (y-asymptote).



3. Results

Table 1 below provides the BMD₁₀s and BMDL₁₀s for the malathion comparative ChE study. Table 2 provides the ratios of the juvenile and adult BMD₁₀s. The dose-response curves and the statistical output from the BMD analyses are provided in Appendix 2.

Overall, the RBC ChE data from the adults and pups (PND11, PND21) fit the exponential equation well. The brain data from the PND21 pups fits the basic model well. Adult rat brain data are shallow (i.e., flat) and provide BMD estimates outside the tested dose range. All of the results for the PND4 pups provides estimates outside the tested dose range. However, because RBC ChE inhibition in pups is a critical endpoint for malathion, the current analysis is sufficiently robust for developing PoDs and for evaluating relative sensitivity between juvenile and adult rats.

- For acute exposures, male PND 11 RBC ChE data provided the most sensitive endpoint: BMD₁₀ = 16.9 mg/kg and BMDL₁₀ = **13.6 mg/kg**.
- For multiple exposures (11 consecutive days) exposures, male PND 21 RBC ChE data provided the most sensitive endpoint: BMD₁₀ = 10.8 mg/kg and BMDL₁₀ = **7.1 mg/kg**.
- Based on the ratios of acute BMD₁₀s for RBC and brain ChE, the juvenile animals are approximately **7-12x** more sensitive than adult animals.
- Based on the ratios of the multidosing BMD₁₀s for RBC ChE, the juvenile animals are approximately **2x** more sensitive than adult animals.

Table 1. BMD₁₀s and BMDL₁₀s for RBC and whole brain cholinesterase inhibition in the malathion developmental neurotoxicity study (MRID no. 45566201).

Sex	Compartment	Exposure	Group	BMD ₁₀ (mg/kg/day)	BMDL ₁₀ (mg/kg/day)	P value (GoF)
F	RBC	Acute	Adult	158	93.7	0.339
M	RBC	Acute	Adult	491*	110	0.147
M	RBC	Acute	Offspring PND11	16.9	13.6	0.183
F	RBC	Acute	Offspring PND11	18.1	14.1	0.804
M	Brain	Acute	Adult	315*	170	0.18
F	Brain	Acute	Adult	NA	NA	NA
F	Brain	Acute	Offspring PND11	23.6	17.8	0.435
M	Brain	Acute	Offspring PND11	24.6	22.7	0.487
F	RBC	Multi	Adult	23.0	15.7	0.978
M	RBC	Multi	Adult	22.7	16.3	0.732
F	RBC	Multi	Dams GD20	21.1	19.4	0.763
Both	RBC	Multi	Fetus GD20	77.8	58.2	0.433
M	RBC	Multi	Offspring PND21	10.8	7.1	0.527
F	RBC	Multi	Offspring PND21	13.8	8.5	0.294
M	RBC	Multi	Offspring PND4	167*	73.7	0.535
F	RBC	Multi	Offspring PND4	477*	124	0.486
F	Brain	Multi	Adult	349*	160	0.675
M	Brain	Multi	Adult	889*	311	0.416
F	Brain	Multi	Dams GD20	416*	242	0.592
Both	Brain	Multi	Fetus GD20	70.4	34.7	0.446
F	Brain	Multi	Offspring PND21	85.7	67.5	0.03
M	Brain	Multi	Offspring PND21	91.2	72.7	0.05
M	Brain	Multi	Offspring PND4	250*	132	0.636
F	Brain	Multi	Offspring PND4	20512*	242	0.91

*Results of BMD analysis are outside dose range.

Table 2. Ratio of adult/pup BMD₁₀ s for RBC, plasma, and whole brain cholinesterase inhibition in the malathion developmental neurotoxicity study (MRID no. 45566201).

Compartment	Sex	Adult BMD ₁₀ / Pup BMD ₁₀
Acute Exposures		
RBC	M	12.4
RBC	F (non-pregnant)	7.1
Brain	M	7.5
Brain	F (non-pregnant)	NA
Multi-Exposures		
RBC	M	2.1
RBC	F (non-pregnant)	1.6
RBC	F (Dams/Fetus GD20)	0.3
Brain	M	Not reported, most BMDs outside tested range.
Brain	F (non-pregnant)	
Brain	F (Dams/Fetus GD20)	

References

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Appendices

1. RBC and brain ChE data extracted from MRID 45566201
2. Dose response curves and BMD analysis

CHEMICAL	MRID	STUDYTYPE	GUIDELINENO.	SEX	TIME	TIMEUNIT	DOSE	CHEA	CHUNIT	SD	N	DUPLICATE
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	0	866	U/ML	167.9	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	5	891	U/ML	169.5	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	50	975	U/ML	83.5	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	150	853	U/ML	60.4	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	0	1109	U/ML	86.5	8	RBCDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	450	831	U/ML	85.3	8	RBCDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	0	13713	U/KG	853.9	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	5	12988	U/KG	414.7	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	50	13081	U/KG	709.6	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	150	12744	U/KG	859.2	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	0	13563	U/KG	391.7	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	M	1	D	450	13131	U/KG	451.1	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	0	950	U/ML	66.8	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	0	1069	U/ML	65.1	8	RBCDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	5	1013	U/ML	108.6	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	50	959	U/ML	104.3	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	150	891	U/ML	64	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	450	884	U/ML	96.3	8	RBCDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	0	12900	U/KG	470.6	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	0	13513	U/KG	501.2	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	5	13213	U/KG	427.4	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	50	13038	U/KG	553.4	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	150	13244	U/KG	244.1	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	82-7	F	1	D	450	12975	U/KG	639.2	8	WHOLEDUPLICATEACUTEADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	0	1084	U/ML	46.2	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	5	1044	U/ML	65.1	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	50	869	U/ML	98.9	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	150	616	U/ML	74.3	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	0	13219	U/KG	601.2	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	5	13288	U/KG	592.7	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	50	13494	U/KG	390.5	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	M	11	D	150	13031	U/KG	723.6	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	0	1094	U/ML	92.3	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	5	1069	U/ML	142.5	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	50	878	U/ML	54.2	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	150	566	U/ML	89.6	8	RBCMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	0	13731	U/KG	1858.6	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	5	13463	U/KG	319.3	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	50	13700	U/KG	463.7	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	82-7	F	11	D	150	13031	U/KG	441.5	8	WHOLEMULITADULT
MALATHION	DAMSGD20	DNT	82-7	F	11	D	0	1234	U/ML	138.2	8	RBCDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	5	1244	U/ML	59.4	8	RBCDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	50	994	U/ML	60.9	8	RBCDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	150	606	U/ML	75.3	8	RBCDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	0	13200	U/KG	418.3	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	5	13013	U/KG	658.9	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	50	13100	U/KG	516.9	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	82-7	F	11	D	150	12644	U/KG	262.5	8	WHOLEDAMSGD20
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	0	13713	U/KG	853.9	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	4.7	12988	U/KG	414.7	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	48	13081	U/KG	709.6	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	145.6	12744	U/KG	859.2	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	0	12900	U/KG	470.6	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	4.7	13213	U/KG	427.4	8	WHOLEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	48	13038	U/KG	553.4	8	WHOLEACUTEADULT

MALATHION	ACUTEADULT	DNT	83-6	F	1	D	145.6	13244	U/KG	244.1	8	WHOLEACUTEADULT
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	0	5756	U/KG	224.3	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	4.7	5688	U/KG	216.7	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	48	5388	U/KG	280	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	145.6	3244	U/KG	699.2	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	436.8	919	U/KG	435	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	F	1	D	0	5825	U/KG	279	8	WHOLEACUTEOFFPND11
MALATHION	ACUTEOFFPND11	DNT	83-6	F	1	D	4.7	5600	U/KG	183.2	8	WHOLEACUTEOFFPND11
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MALATHION	ACUTEOFFPND11	DNT	83-6	F	1	D	436.8	1081	U/KG	512.7	8	WHOLEACUTEOFFPND11
MALATHION	DAMSGD20	DNT	83-6	F	11	D	0	13200	U/KG	418.3	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	83-6	F	11	D	4.7	13013	U/KG	658.9	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	83-6	F	11	D	48	13100	U/KG	516.9	8	WHOLEDAMSGD20
MALATHION	DAMSGD20	DNT	83-6	F	11	D	145.6	12644	U/KG	262.5	8	WHOLEDAMSGD20
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	0	13563	U/KG	391.7	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	436.8	13131	U/KG	451.1	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	0	13513	U/KG	501.2	8	WHOLEDUPLICATEACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	436.8	12975	U/KG	639.2	8	WHOLEDUPLICATEACUTEADULT
MALATHION	FETUSGD20	DNT	83-6	M	11	D	0	1606	U/KG	117.8	8	WHOLEFETUSGD20
MALATHION	FETUSGD20	DNT	83-6	M	11	D	4.7	1656	U/KG	178.2	8	WHOLEFETUSGD20
MALATHION	FETUSGD20	DNT	83-6	M	11	D	48	1519	U/KG	173.1	8	WHOLEFETUSGD20
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MALATHION	MULITADULT	DNT	83-6	M	11	D	0	13219	U/KG	601.2	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	M	11	D	4.7	13288	U/KG	592.7	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	M	11	D	48	13494	U/KG	390.5	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	M	11	D	145.6	13031	U/KG	723.6	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	F	11	D	0	13731	U/KG	1858.6	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	F	11	D	4.7	13463	U/KG	319.3	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	F	11	D	48	13700	U/KG	463.7	8	WHOLEMULITADULT
MALATHION	MULITADULT	DNT	83-6	F	11	D	145.6	13031	U/KG	441.5	8	WHOLEMULITADULT
MALATHION	MULTIOFFPND21	DNT	83-6	M	11	D	0	10500	U/KG	286.6	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	M	11	D	4.7	10363	U/KG	318.2	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	M	11	D	48	10488	U/KG	506.2	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	M	11	D	145.6	8850	U/KG	792.8	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	F	11	D	0	10356	U/KG	252.8	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	F	11	D	4.7	10250	U/KG	381.7	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	F	11	D	48	10444	U/KG	408.3	8	WHOLEMULTIOFFPND21
MALATHION	MULTIOFFPND21	DNT	83-6	F	11	D	145.6	8650	U/KG	931.2	8	WHOLEMULTIOFFPND21
MALATHION	OFFSPRINGPND4	DNT	83-6	M	11	D	0	3018	U/KG	269.8	17	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	M	11	D	4.7	3078	U/KG	216.8	16	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	M	11	D	48	2915	U/KG	326.2	13	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	M	11	D	145.6	2867	U/KG	419.9	15	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	F	11	D	0	2994	U/KG	264.5	18	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	F	11	D	4.7	2941	U/KG	316.8	17	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	F	11	D	48	2953	U/KG	547.8	19	WHOLEOFFSPRINGPND4
MALATHION	OFFSPRINGPND4	DNT	83-6	F	11	D	145.6	2967	U/KG	347.7	18	WHOLEOFFSPRINGPND4
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	0	866	U/L	167.9	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	4.7	891	U/L	169.5	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	48	975	U/L	83.5	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	M	1	D	145.6	853	U/L	60.4	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	0	950	U/L	66.8	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	4.7	1013	U/L	108.6	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	48	959	U/L	104.3	8	RBCACUTEADULT
MALATHION	ACUTEADULT	DNT	83-6	F	1	D	145.6	891	U/L	64	8	RBCACUTEADULT
MALATHION	ACUTEOFFPND11	DNT	83-6	M	1	D	0	1509	U/L	256	8	RBCACUTEOFFPND11

MALATHION ACUTEOFFPND11	DNT	83-6	M	1	D	4.7	1272	U/L	238.5	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	M	1	D	48	1131	U/L	140.6	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	M	1	D	145.6	672	U/L	100.4	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	M	1	D	436.8	428	U/L	94.9	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	F	1	D	0	1319	U/L	110	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	F	1	D	4.7	1228	U/L	228.5	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	F	1	D	48	1016	U/L	127.4	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	F	1	D	145.6	688	U/L	58.2	8	RBCACUTEOFFPND11
MALATHION ACUTEOFFPND11	DNT	83-6	F	1	D	436.8	519	U/L	134.8	8	RBCACUTEOFFPND11
MALATHION DAMSGD20	DNT	83-6	F	11	D	0	1234	U/L	138.2	8	RBCDAMSGD20
MALATHION DAMSGD20	DNT	83-6	F	11	D	4.7	1244	U/L	59.4	8	RBCDAMSGD20
MALATHION DAMSGD20	DNT	83-6	F	11	D	48	994	U/L	60.9	8	RBCDAMSGD20
MALATHION DAMSGD20	DNT	83-6	F	11	D	145.6	606	U/L	75.3	8	RBCDAMSGD20
MALATHION ACUTEADULT	DNT	83-6	M	1	D	0	1109	U/L	86.5	8	RBCDUPLICATEACUTEADULT
MALATHION ACUTEADULT	DNT	83-6	M	1	D	436.8	831	U/L	85.3	8	RBCDUPLICATEACUTEADULT
MALATHION ACUTEADULT	DNT	83-6	F	1	D	0	1069	U/L	65.1	8	RBCDUPLICATEACUTEADULT
MALATHION ACUTEADULT	DNT	83-6	F	1	D	436.8	884	U/L	96.3	8	RBCDUPLICATEACUTEADULT
MALATHION FETUSGD20	DNT	83-6	M	11	D	0	938	U/L	112.6	8	RBCFETUSGD20
MALATHION FETUSGD20	DNT	83-6	M	11	D	4.7	897	U/L	68.7	8	RBCFETUSGD20
MALATHION FETUSGD20	DNT	83-6	M	11	D	48	831	U/L	82.1	8	RBCFETUSGD20
MALATHION FETUSGD20	DNT	83-6	M	11	D	145.6	756	U/L	47.7	8	RBCFETUSGD20
MALATHION MULITADULT	DNT	83-6	M	11	D	0	1084	U/L	46.2	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	M	11	D	4.7	1044	U/L	65.1	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	M	11	D	48	869	U/L	98.9	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	M	11	D	145.6	616	U/L	74.3	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	F	11	D	0	1094	U/L	92.3	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	F	11	D	4.7	1069	U/L	142.5	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	F	11	D	48	878	U/L	54.2	8	RBCMULITADULT
MALATHION MULITADULT	DNT	83-6	F	11	D	145.6	566	U/L	89.6	8	RBCMULITADULT
MALATHION MULTIOFFPND21	DNT	83-6	M	11	D	0	1866	U/L	394.4	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	M	11	D	4.7	1556	U/L	282.1	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	M	11	D	48	1144	U/L	217.8	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	M	11	D	145.6	622	U/L	207.2	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	F	11	D	0	1894	U/L	397.5	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	F	11	D	4.7	1606	U/L	484.4	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	F	11	D	48	1250	U/L	159.8	8	RBCMULTIOFFPND21
MALATHION MULTIOFFPND21	DNT	83-6	F	11	D	145.6	597	U/L	185.4	8	RBCMULTIOFFPND21
MALATHION OFFSPRINGPND4	DNT	83-6	M	11	D	0	1100	U/L	170.2	17	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	M	11	D	4.7	1134	U/L	155.4	16	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	M	11	D	48	1075	U/L	164.3	13	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	M	11	D	145.6	1017	U/L	197	15	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	F	11	D	0	1147	U/L	193.4	18	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	F	11	D	4.7	1125	U/L	190.2	17	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	F	11	D	48	1193	U/L	245.8	19	RBCOFFSPRINGPND4
MALATHION OFFSPRINGPND4	DNT	83-6	F	11	D	145.6	1103	U/L	227.3	18	RBCOFFSPRINGPND4

Appendix 2.
TXR: 0053251

Part 1.
Dose Response Curves for RBC ChE

MALATHION:1-D M:RBCACUTEADULT
 Thu Apr 25 08:49:50 2002
 MRID: ACUTEADULT Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
407.9645	412.3617	-200.9822

Coefficients:

	Value	Std.Error
A	9.057449e+02	3.124529e+01
m	2.144636e-04	4.502991e-04

Correlation:

	A	m
A	1.0000000	0.6460217
m	0.6460217	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	8.441294e+02	9.057449e+02	971.85783230
m	2.944907e-06	2.144636e-04	0.01561837

Residual standard error:			
	lower	est.	upper
	116.0542	145.2290	194.1237

Degrees of freedom: 32 total; 30 residual

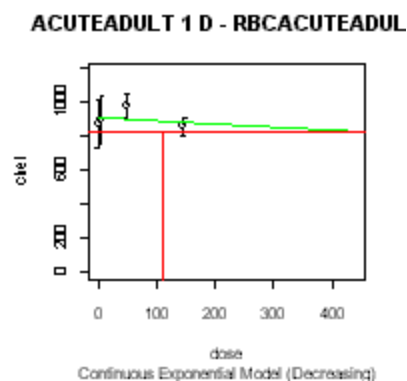
 Goodness of Fit

Pearson Chi-Square Statistic: 3.836 with 2 degrees of freedom. P = 0.147

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	866	905.7449	167.9	134.8345	-0.8337294	
2	4.7	8	891	904.8324	169.5	134.7065	-0.2904378	
3	48.0	8	975	896.4687	83.5	133.5324	1.6634156	
4	145.6	8	853	877.8992	60.4	130.9235	-0.5379138	

 BMD Computation

BMD = 491.3: BMDL = 110.3



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0002145

se: 0.0004503

var=se²: 2.028e-07

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 97

ED50 (95% CI): 3232 (52.75 , 198000)

ln(Potency) -8.447

se[log(Potency)]: 2.1

se[log(Potency)]²: 4.409

MALATHION:1-D: F:RBCACUTEADULT
 Thu Apr 25 08:49:48 2002
 MRID: ACUTEADULT Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
381.2988	385.6960	-187.6494

Coefficients:

	Value	Std.Error
A	9.844632e+02	2.106950e+01
m	6.649749e-04	2.791897e-04

Correlation:

	A	m
A	1.0000000	0.6462695
m	0.6462695	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	9.423603e+02	9.844632e+02	1.028447e+03
m	2.821112e-04	6.649749e-04	1.567437e-03

Residual standard error:

	lower	est.	upper
	74.78741	93.58815	125.09679

Degrees of freedom: 32 total; 30 residual

 Goodness of Fit

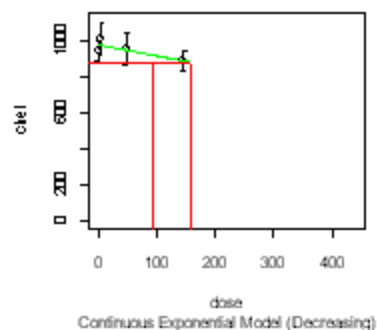
Pearson Chi-Square Statistic: 2.161 with 2 degrees of freedom. P = 0.339

dose	n	chei	Expected	sd	Exp.SD	X2 Resid.	
1	0.0	8	950	984.4632	66.8	90.93073	-1.07198742
2	4.7	8	1013	981.3912	108.6	90.64906	0.98625729
3	48.0	8	959	953.5365	104.3	88.09485	0.17541455
4	145.6	8	891	893.6160	64.0	82.59840	-0.08957983

 BMD Computation

BMD = 158.4: BMDL = 93.72

ACUTEADULT 1 D - RBCACUTEADUL



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.000665

se: 0.0002792

var=se²: 7.795e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 91

ED50 (95% CI): 1042 (457.8 , 2374)

ln(Potency) -7.316

se[log(Potency)]: 0.4198

se[log(Potency)]²: 0.1763

MALATHION:1-D: M:RBCACUTEOFFPND11
 Thu Apr 25 08:49:54 2002
 MRID: ACUTEOFFPND11 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
525.0067	531.7622	-258.5033

Coefficients:

	Value	Std.Error
A	1.432809e+03	61.253576857
B	4.049642e+02	34.048999649
m	8.870840e-03	0.001429793

Correlation:

	A	B	m
A	1.0000000	0.1969656	0.5109123
B	0.1969656	1.0000000	0.6767237
m	0.5109123	0.6767237	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.313921e+03	1.432809e+03	1.562454e+03
B	3.415309e+02	4.049642e+02	4.801790e+02
m	6.399307e-03	8.870840e-03	1.229692e-02

Residual standard error:

	lower	est.	upper
	217.6331	266.9481	345.3633

Degrees of freedom: 40 total; 37 residual

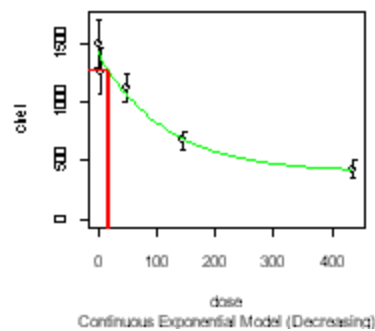
 Goodness of Fit

Pearson Chi-Square Statistic: 3.392 with 2 degrees of freedom. P = 0.183

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1509	1432.8088	256.0	252.08454	0.85487710	
2	4.7	8	1272	1390.8360	238.5	245.02486	-1.37177470	
3	48.0	8	1131	1076.4004	140.6	191.57955	0.80609387	
4	145.6	8	672	687.4491	100.4	123.44702	-0.35396999	
5	436.8	8	428	426.3011	94.9	74.50668	0.06449563	

 BMD Computation

ACUTEOFFPND11 1 D - RBCACUTEOFFPI



BMD = 16.92: BMDL = 13.57

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.008871

se: 0.00143

var=se²: 2.044e-06

Per cent. of background at unit dose: 99

Per cent. of background at the highest dose: 2.1

ED50 (95% CI): 78.14 (56.97 , 107.2)

ln(Potency) -4.725

se[log(Potency)]: 0.1612

se[log(Potency)]²: 0.02598

MALATHION:1-D: F:RBCACUTEOFFPND11
 Thu Apr 25 08:49:52 2002
 MRID: ACUTEOFFPND11 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $chei = B + (A-B) \cdot \exp(-(m \cdot dose)^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
515.2340	521.9896	-253.6170

Coefficients:

	Value	Std.Error
A	1.297809e+03	50.743655615
B	5.073951e+02	33.761809331
m	9.904737e-03	0.001823743

Correlation:

	A	B	m
A	1.0000000	0.1471828	0.4749885
B	0.1471828	1.0000000	0.6444029
m	0.4749885	0.6444029	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.198960e+03	1.297809e+03	1.404808e+03
B	4.433982e+02	5.073951e+02	5.806289e+02
m	6.820505e-03	9.904737e-03	1.438366e-02

Residual standard error:

	lower	est.	upper
	170.5929	209.2487	270.7149

Degrees of freedom: 40 total; 37 residual

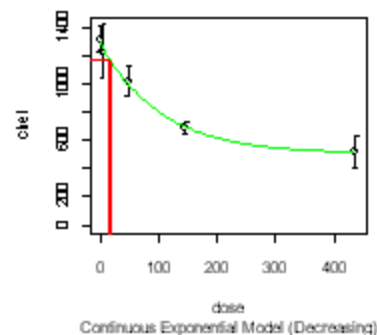
 Goodness of Fit

Pearson Chi-Square Statistic: 0.4364 with 2 degrees of freedom. P = 0.804

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1319	1297.8090	110.0	205.51458	0.29164463	
2	4.7	8	1228	1261.8568	228.5	199.92079	-0.47899656	
3	48.0	8	1016	998.7317	127.4	158.79811	0.30757438	
4	145.6	8	688	694.2677	58.2	110.60333	-0.16028184	
5	436.8	8	519	517.8406	134.8	81.88503	0.04004877	

 BMD Computation

ACUTEOFFPND11 1 D - RBCACUTEOFFPI



BMD = 18.11: BMDL = 14.08

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.009905

se: 0.001824

var=se²: 3.326e-06

Per cent. of background at unit dose: 99

Per cent. of background at the highest dose: 1.3

ED50 (95% CI): 69.98 (48.78 , 100.4)

ln(Potency) -4.615

se[log(Potency)]: 0.1841

se[log(Potency)]²: 0.0339

MALATHION:11-D: F:RBCDAMSGD20
 Thu Apr 25 08:49:55 2002
 MRID: DAMSGD20 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $chei = B + (A-B) \cdot \exp(-(m \cdot dose)^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
380.9895	385.3867	-187.4948

Coefficients:

	Value	Std.Error
A	1.255843e+03	2.594948e+01
m	4.988779e-03	2.702990e-04

Correlation:

	A	m
A	1.0000000	0.6451947
m	0.6451947	1.0000000

Approximate 95% confidence intervals

	lower	est.	upper
A	1.203949e+03	1.255843e+03	1.309973e+03
m	4.466201e-03	4.988779e-03	5.572504e-03

Residual standard error:

	lower	est.	upper
	88.72628	111.03110	148.41231

Degrees of freedom: 32 total; 30 residual

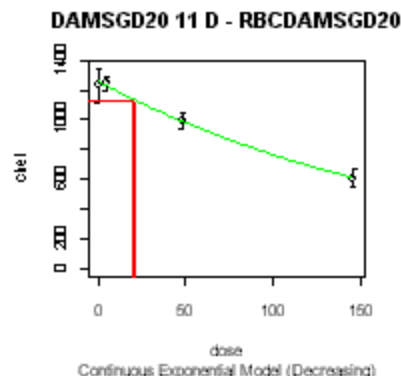
 Goodness of Fit

Pearson Chi-Square Statistic: 0.5412 with 2 degrees of freedom. P = 0.763

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1234	1255.843	138.2	111.94692	-0.55186986	
2	4.7	8	1244	1226.739	59.4	109.37164	0.44638060	
3	48.0	8	994	988.413	60.9	88.26476	0.17903541	
4	145.6	8	606	607.405	75.3	54.43734	-0.07299855	

 BMD Computation

BMD = 21.12: BMDL = 19.39



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.004989

se: 0.0002703

var=se²: 7.306e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 48

ED50 (95% CI): 138.9 (124.9 , 154.5)

ln(Potency) -5.301

se[log(Potency)]: 0.05418

se[log(Potency)]²: 0.002936

MALATHION:11-D: M:RBCFETUSGD20

Thu Apr 25 08:49:57 2002

MRID: FETUSGD20 Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

AIC	BIC	logLik
373.9395	378.3367	-183.9698

Coefficients:

	Value	Std.Error
A	9.120315e+02	1.945783e+01
m	1.353470e-03	2.774847e-04

Correlation:

	A	m
A	1.0000000	0.6474229
m	0.6474229	1.0000000

Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	8.731466e+02	9.120315e+02	9.526481e+02
m	8.904492e-04	1.353470e-03	2.057256e-03

Residual standard error:

	lower	est.	upper
	68.95315	86.28723	115.33784

Degrees of freedom: 32 total; 30 residual

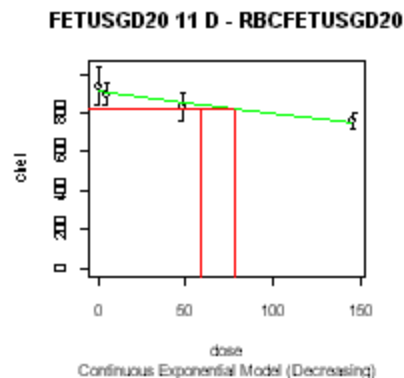
Goodness of Fit

Pearson Chi-Square Statistic: 1.673 with 2 degrees of freedom. P = 0.433

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	938	912.0315	112.6	84.01104	0.8742897	
2	4.7	8	897	906.2482	68.7	83.46673	-0.3133929	
3	48.0	8	831	854.6636	82.1	78.61510	-0.8513737	
4	145.6	8	756	748.9029	47.7	68.68851	0.2922435	

BMD Computation

BMD = 77.84: BMDL = 58.21



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.001353

se: 0.0002775

var=se²: 7.7e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 82

ED50 (95% CI): 512.1 (342.7 , 765.4)

ln(Potency) -6.605

se[log(Potency)]: 0.205

se[log(Potency)]²: 0.04203

MALATHION:11-D: M:RBCMULITADULT
 Thu Apr 25 08:50:00 2002
 MRID: MULITADULT Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
375.4198	381.2827	-183.7099

Coefficients:

	Value	Std.Error
A	1.076373e+03	2.586032e+01
B	3.768753e+02	2.287461e+02
m	7.368520e-03	4.254181e-03

Correlation:

	A	B	m
A	1.0000000	0.441743	0.5069331
B	0.4417430	1.0000000	0.9898870
m	0.5069331	0.989887	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.024761e+03	1.076373e+03	1.130584e+03
B	1.089135e+02	3.768753e+02	1.304109e+03
m	2.262370e-03	7.368520e-03	2.399921e-02

Residual standard error:

	lower	est.	upper
	77.44065	97.23754	130.71790

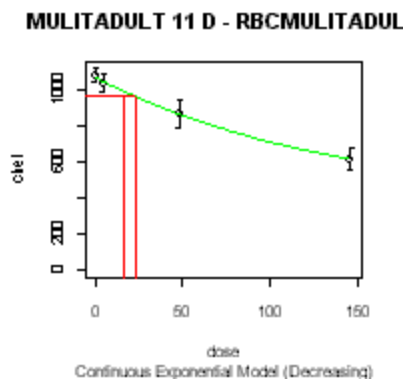
Degrees of freedom: 32 total; 29 residual

 Goodness of Fit

Pearson Chi-Square Statistic: 0.1171 with 1 degrees of freedom. P = 0.732

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1084	1076.3732	46.2	96.57498	0.223369609	
2	4.7	8	1044	1052.5628	65.1	94.42742	-0.256485872	
3	48.0	8	869	867.9881	98.9	77.81414	0.036781678	
4	145.6	8	616	616.1246	74.3	55.27871	-0.006377558	

 BMD Computation



BMD = 22.68: BMDL = 16.27

Potency Measures

A unit dose (1 mg/kg) would result in $100 \times \exp(-\text{Potency})\%$ of background activity

Potency: 0.007369

se: 0.004254

var=se²: 1.81e-05

Per cent. of background at unit dose: 99

Per cent. of background at the highest dose: 34

ED50 (95% CI): 94.07 (30.34 , 291.7)

ln(Potency) -4.911

se[log(Potency)]: 0.5773

se[log(Potency)]²: 0.3333

MALATHION:11-D: F:RBCMULITADULT

Thu Apr 25 08:49:59 2002

MRID: MULITADULT Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

AIC	BIC	logLik
390.0354	395.8983	-191.0177

Coefficients:

	Value	Std.Error
A	1.093226e+03	3.320271e+01
B	3.839115e+01	7.328439e+02
m	4.757877e-03	4.803698e-03

Correlation:

	A	B	m
A	1.0000000	0.4913078	0.5321681
B	0.4913078	1.0000000	0.9971078
m	0.5321681	0.9971078	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.027385e+03	1.093226e+03	1.163287e+03
B	4.254826e-16	3.839115e+01	3.464020e+18
m	6.034301e-04	4.757877e-03	3.751452e-02

Residual standard error:

	lower	est.	upper
	99.23152	124.59902	167.50035

Degrees of freedom: 32 total; 29 residual

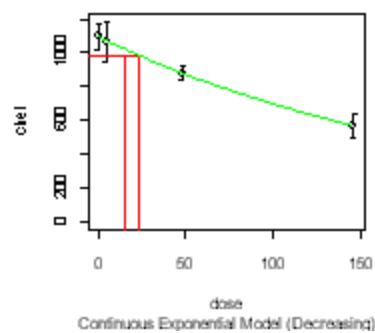
Goodness of Fit

Pearson Chi-Square Statistic: 0.0007631 with 1 degrees of freedom. P = 0.978

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1094	1093.2264	92.3	124.51091	0.017572829	
2	4.7	8	1069	1069.9000	142.5	121.85419	-0.020889466	
3	48.0	8	878	877.8537	54.2	99.98145	0.004140100	
4	145.6	8	566	566.0200	89.6	64.46575	-0.000876037	

BMD Computation

MULITADULT 11 D - RBCMULITADUL



BMD = 23: BMDL = 15.68

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.004758

se: 0.004804

var=se²: 2.308e-05

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 50

ED50 (95% CI): 145.7 (20.14 , 1054)

ln(Potency) -5.348

se[log(Potency)]: 1.01

se[log(Potency)]²: 1.019

MALATHION:11-D: M:RBCMULTIOFFPND21
 Thu Apr 25 08:50:03 2002
 MRID: MULTIOFFPND21 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
457.6937	463.5566	-224.8468

Coefficients:

	Value	Std.Error
A	1.755680e+03	1.122931e+02
B	4.287374e+02	2.226637e+02
m	1.320461e-02	6.258911e-03

Correlation:

	A	B	m
A	1.0000000	0.4008934	0.5205151
B	0.4008934	1.0000000	0.9572020
m	0.5205151	0.9572020	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.540402e+03	1.755680e+03	2.001044e+03
B	1.482144e+02	4.287374e+02	1.240202e+03
m	5.008509e-03	1.320461e-02	3.481309e-02

Residual standard error:

	lower	est.	upper
	354.2618	444.8251	597.9851

Degrees of freedom: 32 total; 29 residual

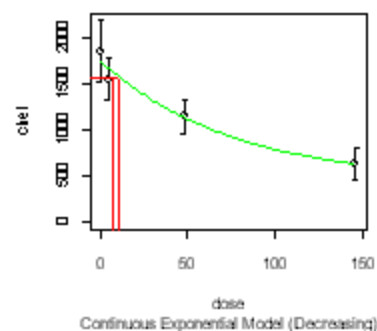
 Goodness of Fit

Pearson Chi-Square Statistic: 1.282 with 1 degrees of freedom. P = 0.257

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1866	1755.680	394.4	420.4892	0.74207041	
2	4.7	8	1556	1675.831	282.1	400.2401	-0.84682479	
3	48.0	8	1144	1132.761	217.8	266.2365	0.11940287	
4	145.6	8	622	622.773	207.2	149.7718	-0.01459905	

 BMD Computation

MULTIOFFPND21 11 D - RBCMULTIOFFP



BMD = 10.75: BMDL = 7.048

Potency Measures

A unit dose (1 mg/kg) would result in $100 \times \exp(-\text{Potency})\%$ of background activity

Potency: 0.0132

se: 0.006259

var=se²: 3.917e-05

Per cent. of background at unit dose: 99

Per cent. of background at the highest dose: 15

ED50 (95% CI): 52.49 (20.73 , 132.9)

ln(Potency) -4.327

se[log(Potency)]: 0.474

se[log(Potency)]²: 0.2247

MALATHION:11-D: F:RBCMULTIOFFPND21

Thu Apr 25 08:50:02 2002

MRID: MULTIOFFPND21 Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

	AIC	BIC	logLik
	461.0653	466.9282	-226.5326

Coefficients:

	Value	Std.Error
A	1.786393e+03	1.169843e+02
B	3.461727e+01	7.701928e+02
m	7.798495e-03	6.468084e-03

Correlation:

	A	B	m
A	1.0000000	0.4907042	0.5542350
B	0.4907042	1.0000000	0.9926882
m	0.5542350	0.9926882	1.0000000

Approximate 95% confidence intervals

	Coefficients:		
	lower	est.	upper
A	1.562464e+03	1.786393e+03	2.042415e+03
B	5.986781e-19	3.461727e+01	2.001669e+21
m	1.429914e-03	7.798495e-03	4.253160e-02

Residual standard error:

	lower	est.	upper
	370.2580	464.9105	624.9863

Degrees of freedom: 32 total; 29 residual

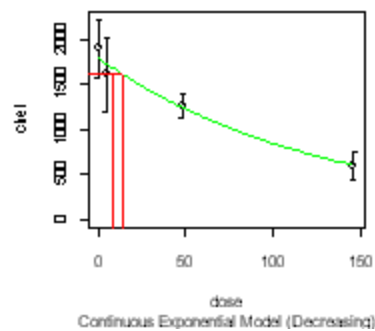
Goodness of Fit

Pearson Chi-Square Statistic: 1.102 with 1 degrees of freedom. P = 0.294

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1894	1786.3930	397.5	439.9081	0.691868383	
2	4.7	8	1606	1723.3478	484.4	423.6918	-0.783375232	
3	48.0	8	1250	1239.4036	159.8	301.4406	0.099426278	
4	145.6	8	597	597.4173	185.4	147.4604	-0.008004688	

BMD Computation

MULTIOFFPND21 11 D - RBCMULTIOFFP



BMD = 13.79: BMDL = 8.542

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.007798

se: 0.006468

var=se²: 4.184e-05

Per cent. of background at unit dose: 99

Per cent. of background at the highest dose: 32

ED50 (95% CI): 88.88 (17.49 , 451.7)

ln(Potency) -4.854

se[log(Potency)]: 0.8294

se[log(Potency)]²: 0.6879

MALATHION:11-D: M:RBCOFFSPRINGPND4
 Thu Apr 25 08:50:06 2002
 MRID: OFFSPRINGPND4 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

	AIC	BIC	logLik
	806.5705	815.0140	-399.2853

Coefficients:

	Value	Std.Error
A	1.117123e+03	3.327972e+01
B	8.463501e+02	2.237388e+03
m	3.183493e-03	3.331199e-02

Correlation:

	A	B	m
A	1.0000000	0.4334560	0.4601892
B	0.4334560	1.0000000	0.9984256
m	0.4601892	0.9984256	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.052454e+03	1.117123e+03	1185.766
B	4.259905e+00	8.463501e+02	168151.283
m	2.548042e-12	3.183493e-03	3977417.603

Residual standard error:

	lower	est.	upper
	153.2237	181.0013	221.1752

Degrees of freedom: 61 total; 58 residual

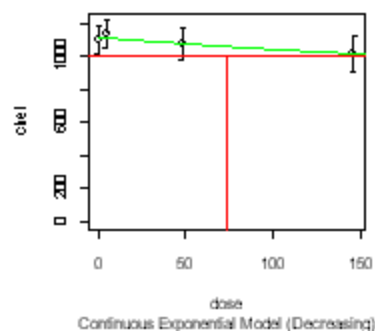
 Goodness of Fit

Pearson Chi-Square Statistic: 0.3844 with 1 degrees of freedom. P = 0.535

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	17	1100	1117.123	170.2	178.2939	-0.39597695	
2	4.7	16	1134	1113.102	155.4	177.6596	0.47052175	
3	48.0	13	1075	1078.753	164.3	172.2185	-0.07857520	
4	145.6	15	1017	1016.685	197.0	162.2593	0.00752855	

 BMD Computation

OFFSPRINGPND4 11 D - RBCOFFSPRINGI



BMD = 167.1: BMDL = 73.71

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.003183

se: 0.03331

var=se²: 0.00111

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 63

ED50 (95% CI): 217.7 (2.697e-07 , 1.758e+11)

ln(Potency) -5.75

se[log(Potency)]: 10.46

se[log(Potency)]²: 109.5

MALATHION:11-D: F:RBCOFFSPRINGPND4
 Thu Apr 25 08:50:05 2002
 MRID: OFFSPRINGPND4 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

	AIC	BIC	logLik
	982.1788	989.0088	-488.0894

Coefficients:

	Value	Std.Error
A	1.155579e+03	3.392142e+01
m	2.208066e-04	3.819503e-04

Correlation:

	A	m
A	1.0000000	0.6523093
m	0.6523093	1.0000000

Approximate 95% confidence intervals

	Coefficients:		
	lower	est.	upper
A	1.089867e+03	1.155579e+03	1.225252e+03
m	7.009867e-06	2.208066e-04	6.955275e-03

	Residual standard error:		
	lower	est.	upper
	193.3097	225.2265	269.8656

Degrees of freedom: 72 total; 70 residual

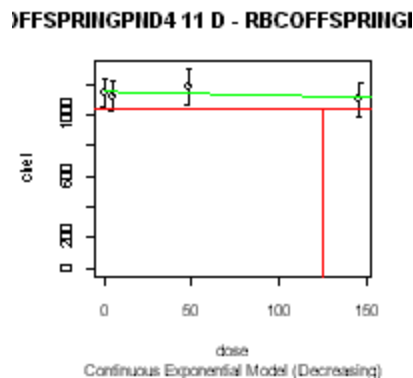
 Goodness of Fit

Pearson Chi-Square Statistic: 1.444 with 2 degrees of freedom. P = 0.486

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	18	1147	1155.579	193.4	218.0934	-0.1668809	
2	4.7	17	1125	1154.380	190.2	217.8737	-0.5559937	
3	48.0	19	1193	1143.396	245.8	215.8607	1.0016681	
4	145.6	18	1103	1119.018	227.3	211.3911	-0.3214863	

 BMD Computation

BMD = 477.2: BMDL = 124.1



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0002208

se: 0.000382

var=se²: 1.459e-07

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 97

ED50 (95% CI): 3139 (105.8 , 93160)

ln(Potency) -8.418

se[log(Potency)]: 1.73

se[log(Potency)]²: 2.992

Part 2.

Dose Response Curves for Brain ChE

MALATHION:1-D:BRAIN:M:WHOLEACUTEADULT
 Thu Apr 25 09:45:17 2002
 MRID: ACUTEADULT Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
518.8408	523.2380	-256.4204

Coefficients:

	Value	Std.Error
A	1.334862e+04	1.778118e+02
m	3.346471e-04	1.736942e-04

Correlation:

	A	m
A	1.0000000	0.6464333
m	0.6464333	1.0000000

Approximate 95% confidence intervals

Coefficients:

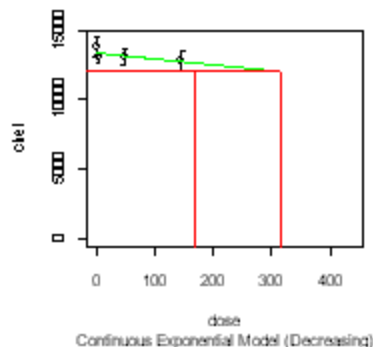
	lower	est.	upper
A	1.299037e+04	1.334862e+04	1.371674e+04
m	1.159387e-04	3.346471e-04	9.659300e-04

Residual standard error:

	lower	est.	upper
	630.0095	788.3870	1053.8160

Degrees of freedom: 32 total; 30 residual

ACUTEADULT 1 D - WHOLEACUTEADU



 Goodness of Fit

Pearson Chi-Square Statistic: 3.431 with 2 degrees of freedom. P = 0.18

dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	13713	13348.62	853.9	767.4380	1.3429448
2	4.7	8	12988	13327.64	414.7	766.2319	-1.2537272
3	48.0	8	13081	13135.91	709.6	755.2091	-0.2056563
4	145.6	8	12744	12713.80	859.2	730.9413	0.1168487

 BMD Computation

BMD = 314.8: BMDL = 169.8

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0003346

se: 0.0001737

var=se²: 3.017e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 95

ED50 (95% CI): 2071 (748.9 , 5729)

ln(Potency) -8.002

se[log(Potency)]: 0.519

se[log(Potency)]²: 0.2694

MALATHION:1-D:BRAIN:F:WHOLEACUTEADULT

Thu Apr 25 09:45:15 2002

MRID: ACUTEADULT Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

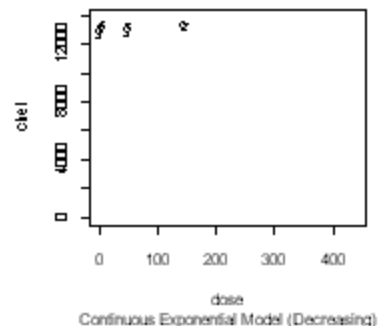
Result from fitting model

Error in qr(attr(rhs, "gradient")) : NA/NaN/Inf in foreign function

call (arg 1)

	dose	n	chei	sd
1	0.0	8	12900	470.6
2	4.7	8	13213	427.4
3	48.0	8	13038	553.4
4	145.6	8	13244	244.1

ACUTEADULT 1 D - WHOLEACUTEADU



MALATHION:1-D:BRAIN:M:WHOLEACUTEOFFPND11
 Thu Apr 25 09:45:22 2002
 MRID: ACUTEOFFPND11 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

AIC	BIC	logLik
646.7728	651.8394	-320.3864

Coefficients:

	Value	Std.Error
A	6.035424e+03	2.504145e+02
m	4.276937e-03	2.195004e-04

Correlation:

	A	m
A	1.0000000	0.5862987
m	0.5862987	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	5.549192e+03	6.035424e+03	6.564260e+03
m	3.854886e-03	4.276937e-03	4.745197e-03

Residual standard error:

	lower	est.	upper
	978.3643	1197.1480	1542.8583

Degrees of freedom: 40 total; 38 residual

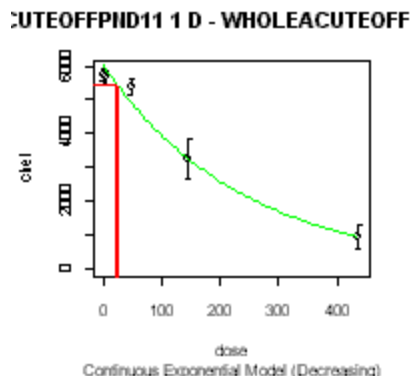
Goodness of Fit

Pearson Chi-Square Statistic: 2.433 with 3 degrees of freedom. P = 0.487

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	5756	6035.424	224.3	1234.7510	-0.64007279	
2	4.7	8	5688	5915.314	216.7	1212.0157	-0.53047159	
3	48.0	8	5388	4915.302	280.0	1021.2935	1.30911725	
4	145.6	8	3244	3237.897	699.2	694.2969	0.02486259	
5	436.8	8	919	931.909	435.0	219.5214	-0.16632585	

BMD Computation

BMD = 24.63: BMDL = 22.72



Potency Measures

A unit dose (1 mg/kg) would result in $100 \times \exp(-\text{Potency})\%$ of background activity

Potency: 0.004277

se: 0.0002195

var=se²: 4.818e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 15

ED50 (95% CI): 162.1 (146.6 , 179.2)

ln(Potency) -5.455

se[log(Potency)]: 0.05132

se[log(Potency)]²: 0.002634

MALATHION:1-D:BRAIN:F:WHOLEACUTEOFFPND11
 Thu Apr 25 09:45:19 2002
 MRID: ACUTEOFFPND11 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

	AIC	BIC	logLik
	657.2576	664.0131	-324.6288

Coefficients:

	Value	Std.Error
A	5.947164e+03	3.326481e+02
B	3.954612e+02	4.629493e+02
m	4.796849e-03	1.352426e-03

Correlation:

	A	B	m
A	1.0000000	0.4963229	0.5982417
B	0.4963229	1.0000000	0.9702511
m	0.5982417	0.9702511	1.0000000

Approximate 95% confidence intervals

	lower	est.	upper
A	5.309945e+03	5.947164e+03	6.660851e+03
B	3.689502e+01	3.954612e+02	4.238771e+03
m	2.709308e-03	4.796849e-03	8.492854e-03

Residual standard error:

	lower	est.	upper
	1125.205	1380.173	1785.595

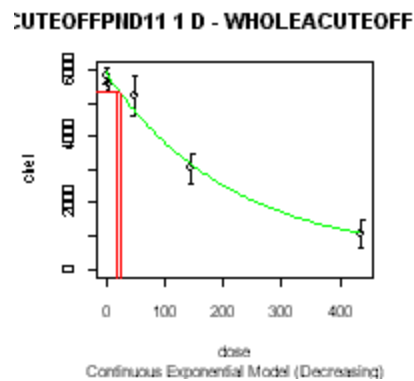
Degrees of freedom: 40 total; 37 residual

Goodness of Fit

Pearson Chi-Square Statistic: 1.666 with 2 degrees of freedom. P = 0.435

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	5825	5947.164	279.0	1407.6963	-0.24545831	
2	4.7	8	5600	5823.400	183.2	1378.5557	-0.45835650	
3	48.0	8	5249	4805.378	728.5	1138.6662	1.10194888	
4	145.6	8	3044	3156.711	559.6	749.2634	-0.42547770	
5	436.8	8	1081	1078.530	512.7	255.5977	0.02732784	

BMD Computation



BMD = 23.62: BMDL = 17.77

Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.004797

se: 0.001352

var=se²: 1.829e-06

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 12

ED50 (95% CI): 144.5 (83.15 , 251.1)

ln(Potency) -5.34

se[log(Potency)]: 0.2819

se[log(Potency)]²: 0.07949

MALATHION:11-D:BRAIN:F:WHOLEDAMSGD20

Thu Apr 25 09:45:25 2002

MRID: DAMSGD20 Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

AIC	BIC	logLik
489.2395	493.6367	-241.6197

Coefficients:

	Value	Std.Error
A	1.315180e+04	1.115152e+02
m	2.530611e-04	1.105630e-04

Correlation:

	A	m
A	1.0000000	0.6464333
m	0.6464333	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.292602e+04	1.315180e+04	1.338153e+04
m	1.036850e-04	2.530611e-04	6.176396e-04

Residual standard error:

	lower	est.	upper
	386.0230	483.0650	645.7002

Degrees of freedom: 32 total; 30 residual

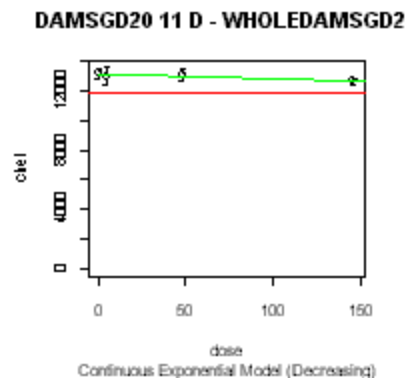
Goodness of Fit

Pearson Chi-Square Statistic: 1.049 with 2 degrees of freedom. P = 0.592

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	13200	13151.80	418.3	481.3011	0.2832490	
2	4.7	8	13013	13136.17	658.9	480.7290	-0.7246706	
3	48.0	8	13100	12993.01	516.9	475.4902	0.6364061	
4	145.6	8	12644	12676.03	262.5	463.8900	-0.1953068	

BMD Computation

BMD = 416.3: BMDL = 242.3



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0002531

se: 0.0001106

var=se²: 1.222e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 96

ED50 (95% CI): 2739 (1163 , 6449)

ln(Potency) -8.282

se[log(Potency)]: 0.4369

se[log(Potency)]²: 0.1909

MALATHION:11-D:BRAIN:M:WHOLEFETUSGD20

Thu Apr 25 09:45:27 2002

MRID: FETUSGD20 Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

Highest 1 doses dropped from data set.

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

	AIC	BIC	logLik
	315.0734	318.6075	-154.5367

Coefficients:

	Value	Std.Error
A	1.635253e+03	4.271073e+01
m	1.495882e-03	9.382458e-04

Correlation:

	A	m
A	1.0000000	0.6307342
m	0.6307342	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.549033e+03	1.635253e+03	1.726273e+03
m	4.073605e-04	1.495882e-03	5.493078e-03

Residual standard error:

	lower	est.	upper
	127.1679	164.4281	232.7236

Degrees of freedom: 24 total; 22 residual

Goodness of Fit

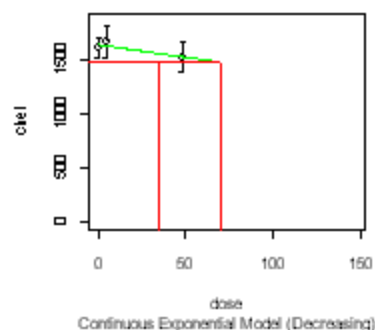
Pearson Chi-Square Statistic: 0.582 with 1 degrees of freedom. P = 0.446

dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	1606	1635.253	117.8	162.3436	-0.50966756
2	4.7	8	1656	1623.797	178.2	161.2130	0.56499254
3	48.0	8	1519	1521.955	173.1	151.1608	-0.05528591

BMD Computation

BMD = 70.43: BMDL = 34.67

FETUSGD20 11 D - WHOLEFETUSGD2



Potency Measures

A unit dose (1 mg/kg) would result in $100 \times \exp(-\text{Potency})\%$ of background activity

Potency: 0.001496

se: 0.0009382

var=se²: 8.803e-07

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 93

ED50 (95% CI): 463.4 (135.5 , 1584)

ln(Potency) -6.505

se[log(Potency)]: 0.6272

se[log(Potency)]²: 0.3934

MALATHION:11-D:BRAIN:M:WHOLEMULITADULT
 Thu Apr 25 09:45:32 2002
 MRID: MULITADULT Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
502.8080	507.2052	-248.4040

Coefficients:

	Value	Std.Error
A	1.333581e+04	1.369340e+02
m	1.185136e-04	1.338915e-04

Correlation:

	A	m
A	1.0000000	0.6464333
m	0.6464333	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.305906e+04	1.333581e+04	1.361842e+04
m	1.179597e-05	1.185136e-04	1.190701e-03

Residual standard error:			
	lower	est.	upper
	477.8846	598.0196	799.3568

Degrees of freedom: 32 total; 30 residual

 Goodness of Fit

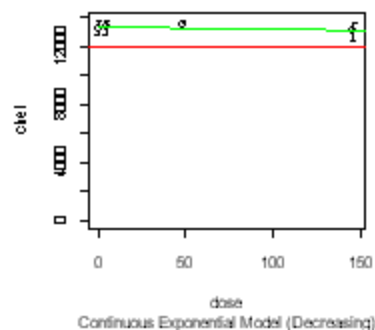
Pearson Chi-Square Statistic: 1.756 with 2 degrees of freedom. P = 0.416

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	13219	13335.81	601.2	591.0088	-0.5590057	
2	4.7	8	13288	13328.38	592.7	590.6797	-0.1933559	
3	48.0	8	13494	13260.16	390.5	587.6563	1.1254936	
4	145.6	8	13031	13107.66	723.6	580.8981	-0.3732762	

 BMD Computation

BMD = 889: BMDL = 311

MULITADULT 11 D - WHOLEMULITADULT



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0001185

se: 0.0001339

var=se²: 1.793e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 98

ED50 (95% CI): 5849 (638.8 , 53550)

ln(Potency) -9.04

se[log(Potency)]: 1.13

se[log(Potency)]²: 1.276

MALATHION:11-D:BRAIN:F:WHOLEMULITADULT

Thu Apr 25 09:45:29 2002

MRID: MULITADULT Guideline: 83-6

Continuous Exponential Model (Decreasing)

Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

Summary of Model Fitting Results

AIC	BIC	logLik
534.4612	538.8585	-264.2306

Coefficients:

	Value	Std.Error
A	1.368272e+04	2.265776e+02
m	3.023568e-04	2.159802e-04

Correlation:

	A	m
A	1.0000000	0.6463367
m	0.6463367	1.0000000

Approximate 95% confidence intervals

	lower	est.	upper
A	1.322772e+04	1.368272e+04	1.415336e+04
m	7.029964e-05	3.023568e-04	1.300428e-03

Residual standard error:

	lower	est.	upper
	784.3000	981.4646	1311.8975

Degrees of freedom: 32 total; 30 residual

Goodness of Fit

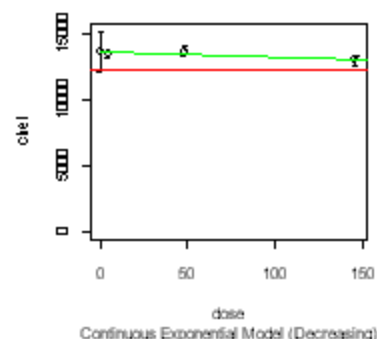
Pearson Chi-Square Statistic: 0.7875 with 2 degrees of freedom. P = 0.675

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	13731	13682.72	1858.6	977.8769	0.1396540	
2	4.7	8	13463	13663.29	319.3	976.5015	-0.5801287	
3	48.0	8	13700	13485.57	463.7	963.9210	0.6291940	
4	145.6	8	13031	13093.43	441.5	936.1550	-0.1886131	

BMD Computation

BMD = 348.5: BMDL = 160.2

MULITADULT 11 D - WHOLEMULITADULT



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0003024

se: 0.000216

var=se²: 4.665e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 96

ED50 (95% CI): 2292 (565.3 , 9297)

ln(Potency) -8.104

se[log(Potency)]: 0.7143

se[log(Potency)]²: 0.5103

MALATHION:11-D:BRAIN:M:WHOLEMULTIOFFPND21
 Thu Apr 25 09:45:36 2002
 MRID: MULTIOFFPND21 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
503.2413	507.6385	-248.6207

Coefficients:

	Value	Std.Error
A	1.061918e+04	1.449553e+02
m	1.155797e-03	1.785187e-04

Correlation:

	A	m
A	1.0000000	0.6452928
m	0.6452928	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.032723e+04	1.061918e+04	1.091938e+04
m	8.431170e-04	1.155797e-03	1.584437e-03

Residual standard error:			
	lower	est.	upper
	494.8886	619.2983	827.7995

Degrees of freedom: 32 total; 30 residual

 Goodness of Fit

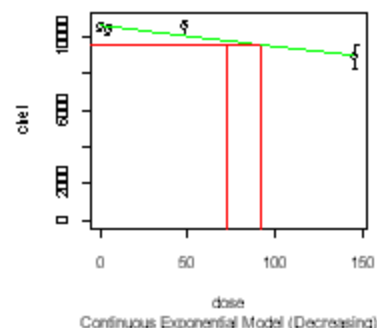
Pearson Chi-Square Statistic: 5.994 with 2 degrees of freedom. P = 0.0499

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	10500	10619.181	286.6	625.3647	-0.5390359	
2	4.7	8	10363	10561.651	318.2	622.0764	-0.9032175	
3	48.0	8	10488	10046.091	506.2	592.5844	2.1092469	
4	145.6	8	8850	8974.416	792.8	531.1345	-0.6625471	

 BMD Computation

BMD = 91.16: BMDL = 72.69

JLTIOFFPND21 11 D - WHOLEMULTIOFF



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.001156

se: 0.0001785

var=se²: 3.187e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 85

ED50 (95% CI): 599.7 (443.1 , 811.7)

ln(Potency) -6.763

se[log(Potency)]: 0.1545

se[log(Potency)]²: 0.02386

MALATHION:11-D:BRAIN:F:WHOLEMULTIOFFPND21
 Thu Apr 25 09:45:34 2002
 MRID: MULTIOFFPND21 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
510.1614	514.5586	-252.0807

Coefficients:

	Value	Std.Error
A	1.052225e+04	1.620411e+02
m	1.229722e-03	2.015709e-04

Correlation:

	A	m
A	1.0000000	0.6449632
m	0.6449632	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	1.019647e+04	1.052225e+04	1.085844e+04
m	8.798776e-04	1.229722e-03	1.718667e-03

Residual standard error:			
	lower	est.	upper
	555.5102	695.1594	929.2010

Degrees of freedom: 32 total; 30 residual

 Goodness of Fit

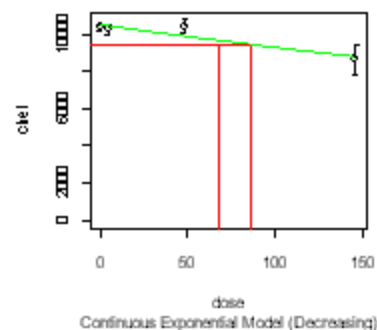
Pearson Chi-Square Statistic: 6.75 with 2 degrees of freedom. P = 0.0342

dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	8	10356	10522.249	252.8	698.9905	-0.6727165
2	4.7	8	10250	10461.609	381.7	695.1058	-0.8610488
3	48.0	8	10444	9919.131	408.3	660.3174	2.2482444
4	145.6	8	8650	8797.296	931.2	588.1547	-0.7083436

 BMD Computation

BMD = 85.68: BMDL = 67.48

JLTIOFFPND21 11 D - WHOLEMULTIOFF



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.00123

se: 0.0002016

var=se²: 4.063e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 84

ED50 (95% CI): 563.7 (408.8 , 777.2)

ln(Potency) -6.701

se[log(Potency)]: 0.1639

se[log(Potency)]²: 0.02687

MALATHION:11-D:BRAIN:M:WHOLEOFFSPRINGPND4
 Thu Apr 25 09:45:41 2002
 MRID: OFFSPRINGPND4 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

AIC	BIC	logLik
878.8512	885.1838	-436.4256

Coefficients:

	Value	Std.Error
A	3.033684e+03	52.725958859
m	4.222819e-04	0.000229924

Correlation:

	A	m
A	1.0000000	0.6256597
m	0.6256597	1.0000000

Approximate 95% confidence intervals

Coefficients:			
	lower	est.	upper
A	2.929993e+03	3.033684e+03	3.141045e+03
m	1.420489e-04	4.222819e-04	1.255356e-03

Residual standard error:			
	lower	est.	upper
	276.2781	325.9403	397.5370

Degrees of freedom: 61 total; 59 residual

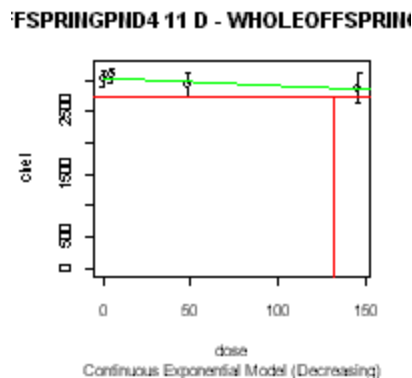
 Goodness of Fit

Pearson Chi-Square Statistic: 0.9064 with 2 degrees of freedom. P = 0.636

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	17	3018	3033.684	269.8	321.3084	-0.2012621	
2	4.7	16	3078	3027.669	216.8	320.6651	0.6278320	
3	48.0	13	2915	2972.812	326.2	314.7990	-0.6621473	
4	145.6	15	2867	2852.779	419.9	301.9669	0.1823997	

 BMD Computation

BMD = 249.5: BMDL = 131.6



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: 0.0004223

se: 0.0002299

var=se²: 5.287e-08

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 94

ED50 (95% CI): 1641 (564.6 , 4772)

ln(Potency) -7.77

se[log(Potency)]: 0.5445

se[log(Potency)]²: 0.2965

MALATHION:11-D:BRAIN:F:WHOLEOFFSPRINGPND4
 Thu Apr 25 09:45:39 2002
 MRID: OFFSPRINGPND4 Guideline: 83-6
 Continuous Exponential Model (Decreasing)
 Formula: $\text{chei} = B + (A-B) \cdot \exp(-(m \cdot \text{dose})^g)$

Variance Function: power

The BMD corresponds to a dose that results in a 10% reduction in the response relative to the control

 Summary of Model Fitting Results

	AIC	BIC	logLik
	1064.8983	1071.7283	-529.4491

Coefficients:

	Value	Std.Error
A	2.964679e+03	5.961483e+01
m	5.136611e-06	2.614994e-04

Correlation:

	A	m
A	1.0000000	0.6525194
m	0.6525194	1.0000000

Approximate 95% confidence intervals

	Coefficients:		
	lower	est.	upper
A	2.848133e+03	2.964679e+03	3.085993e+03
m	4.118399e-50	5.136611e-06	6.406561e+38

	Residual standard error:		
	lower	est.	upper
	332.2519	387.1090	463.8326

Degrees of freedom: 72 total; 70 residual

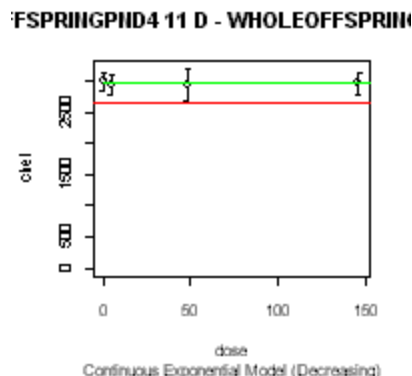
 Goodness of Fit

Pearson Chi-Square Statistic: 0.1878 with 2 degrees of freedom. P = 0.91

	dose	n	chei	Expected	sd	Exp.SD	X2	Resid.
1	0.0	18	2994	2964.679	264.5	383.3179	0.32453278	
2	4.7	17	2941	2964.607	316.8	383.3087	-0.25393417	
3	48.0	19	2953	2963.948	547.8	383.2234	-0.12452524	
4	145.6	18	2967	2962.462	347.7	383.0314	0.05026073	

 BMD Computation

BMD = 20510: BMDL = 242.1



Potency Measures

A unit dose (1 mg/kg) would result in $100 \cdot \exp(-\text{Potency})\%$ of background activity

Potency: $5.137\text{e-}06$

se: 0.0002615

var=se²: $6.838\text{e-}08$

Per cent. of background at unit dose: 100

Per cent. of background at the highest dose: 100

ED50 (95% CI): 134900 ($6.246\text{e-}39$, $2.914999999999999\text{e+}48$)

ln(Potency) -12.18

se[log(Potency)]: 50.91

se[log(Potency)]²: 2592