UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND
TOXIC SUBSTANCES

TXR no. 0053251

Date: April 11, 2005

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 However, when a BMD estimate is used as the point of departure (PoD) for risk estimation, the Agency's draft guidance on use of benchmark dose (USEPA, 2000) specifies that the **BMDL, and not the BMD, should be used**.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 calculated 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

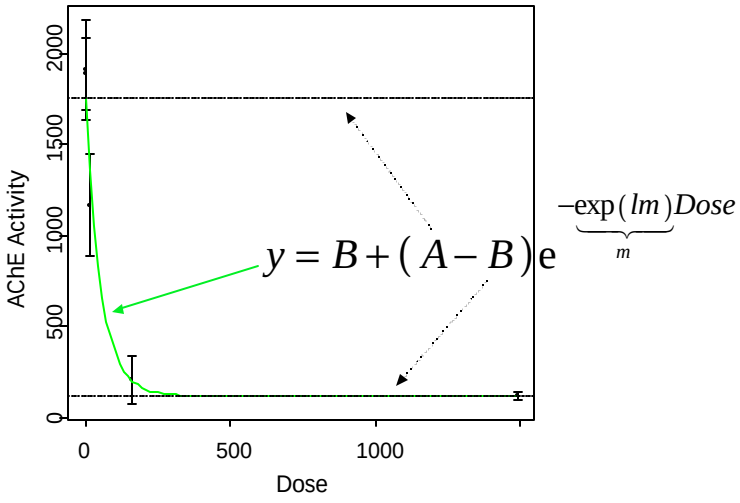
assessment of the Preliminary OP Cumulative Risk Assessment (USEPA, 2001a).

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

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

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 BMD_{10}s and $BMDL_{10}$s for the malathion comparative ChE study. Table 2 provides the ratios of the juvenile and adult BMD_{10}s. 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: BMD_{10} =16.9 mg/kg and $BMDL_{10}$ = **13.6 mg/kg**.

- For multiple exposures (11 consecutive days) exposures, male PND 21 RBC ChE data provided the most sensitive endpoint: BMD_{10} =10.8 mg/kg and $BMDL_{10}$ = **7.1 mg/kg**.

- Based on the ratios of acute BMD_{10}s for RBC and brain ChE, the juvenile animals are approximately **7-12x** more sensitive than adult animals.

- Based on the ratios of the multidosing BMD_{10}s for RBC ChE, the juvenile animals are approximately **2x** more sensitive than adult animals.

Table 1. BMD_{10} s and $BMDL_{10}$ s 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 BMD_{10} 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
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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
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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
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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: chei = B + (A-B)*exp(-(m*dose)^g)

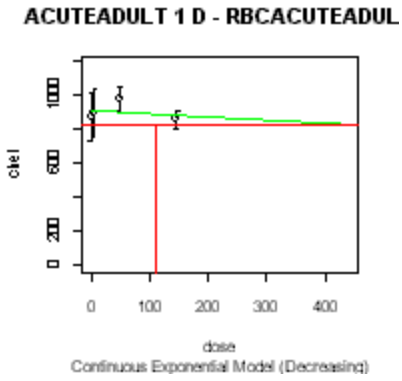
Variance Function: power

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*exp(-Potency)% of background activity

Potency: 0.0002145
se: 0.0004503
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

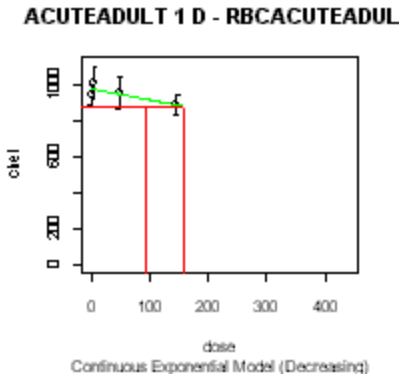
Variance Function: power

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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.000665
se: 0.0002792
var=se^2: 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: chei = B + (A-B)*exp(-(m*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

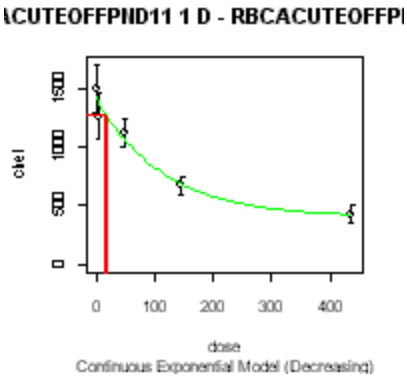
AIC	BIC	logLik
525.0067	531.7622	-258.5033

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

BMD = 16.92: BMDL = 13.57

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.008871
se: 0.00143
var=se^2: 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)*exp(-(m*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

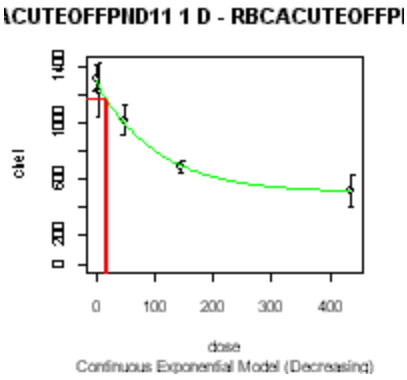
AIC	BIC	logLik
515.2340	521.9896	-253.6170

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

BMD = 18.11: BMDL = 14.08

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.009905
se: 0.001824
var=se^2: 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)*exp(-(m*dose)^g)

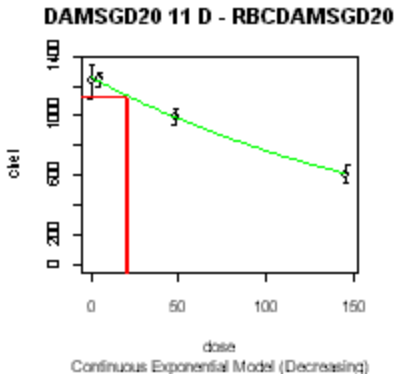
Variance Function: power

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

 Coefficients:
         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*exp(-Potency)% of background activity

Potency: 0.004989
se: 0.0002703
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

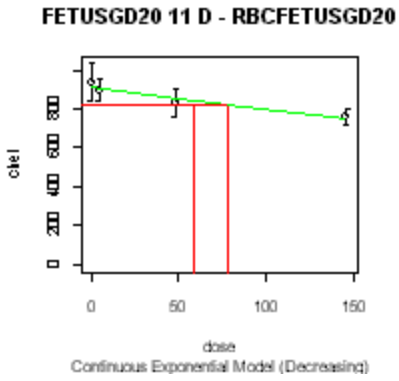
Variance Function: power

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*exp(-Potency)% of background activity

Potency: 0.001353
se: 0.0002775
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

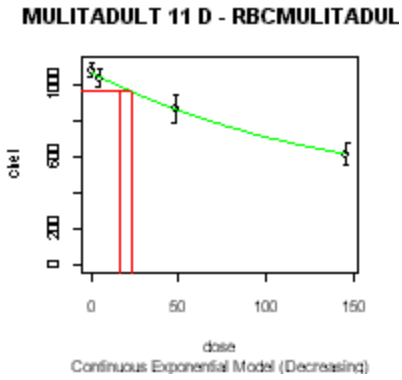
Variance Function: power

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 1.000000 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*exp(-Potency)% of background activity

Potency: 0.007369
se: 0.004254
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

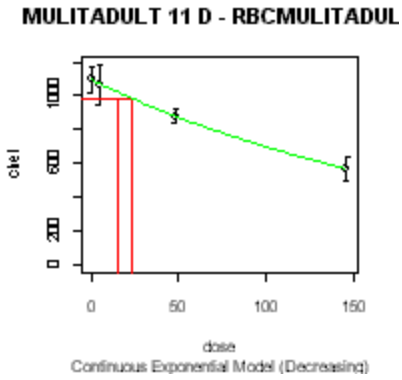
Variance Function: power

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

BMD = 23: BMDL = 15.68

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.004758
se: 0.004804
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

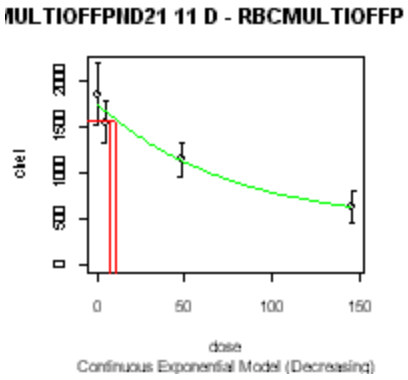
Variance Function: power

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

BMD = 10.75: BMDL = 7.048

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.0132
se: 0.006259
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

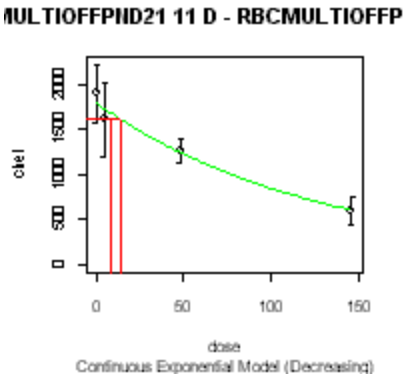
Variance Function: power

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

BMD = 13.79: BMDL = 8.542

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.007798
se: 0.006468
var=se^2: 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: chei = B + (A-B)*exp(-(m*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

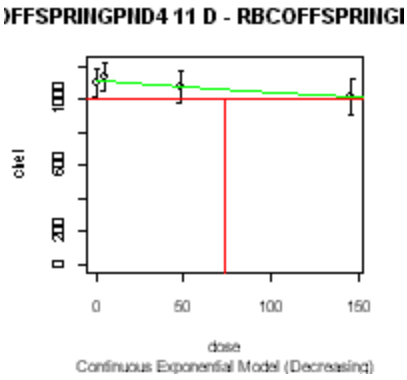
AIC	BIC	logLik
806.5705	815.0140	-399.2853

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

BMD = 167.1: BMDL = 73.71

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.003183
se: 0.03331
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

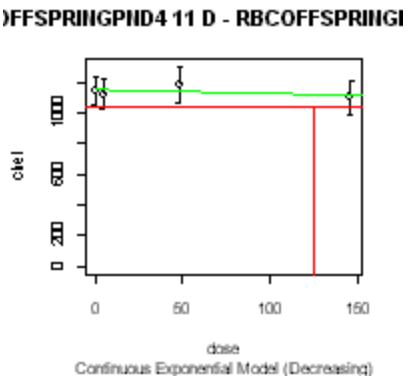
Variance Function: power

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*exp(-Potency)% of background activity

Potency: 0.0002208
se: 0.000382
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

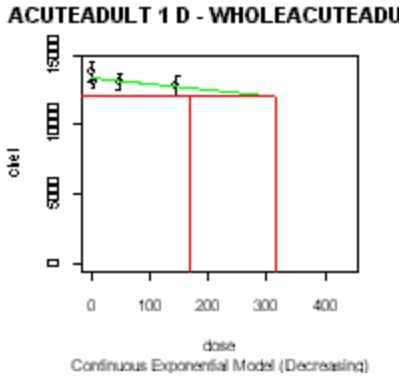
Variance Function: power

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
```



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

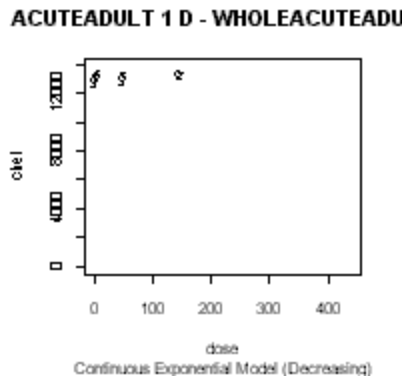
Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.0003346
se: 0.0001737
var=se^2: 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: chei = B + (A-B)*exp(-(m*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
```



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

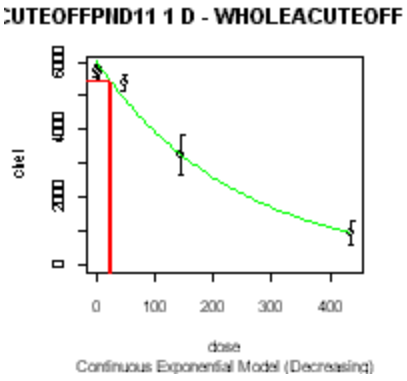
Variance Function: power

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*exp(-Potency)% of background activity

Potency: 0.004277
se: 0.0002195
var=se^2: 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: chei = B + (A-B)*exp(-(m*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

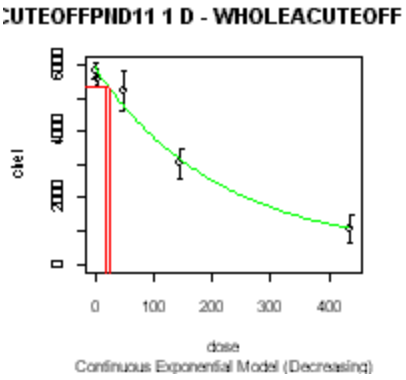
Coefficients:

	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*exp(-Potency)% of background activity

Potency: 0.004797
se: 0.001352
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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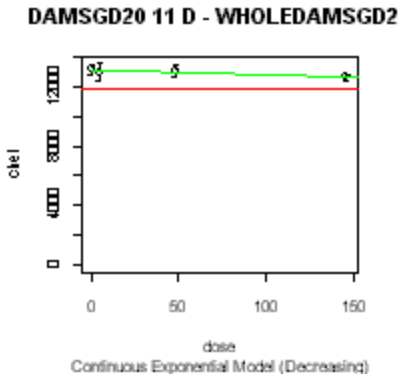
Summary of Model Fitting Results

```
      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*exp(-Potency)% of background activity

Potency: 0.0002531
se: 0.0001106
var=se^2: 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: chei = B + (A-B)*exp(-(m*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

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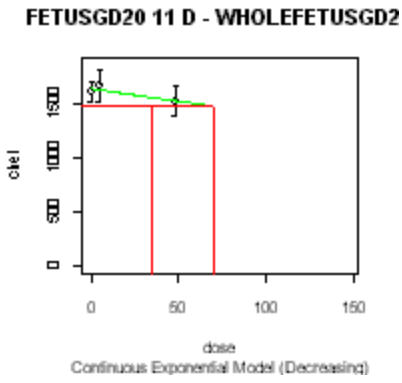
Summary of Model Fitting Results

```
      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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.001496
se: 0.0009382
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

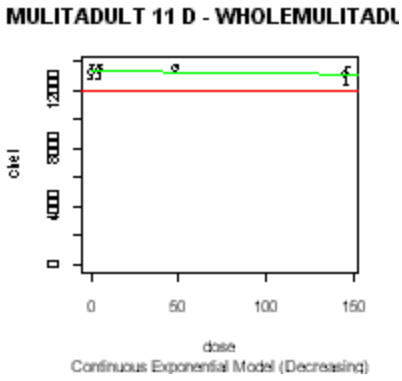
Variance Function: power

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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.0001185
se: 0.0001339
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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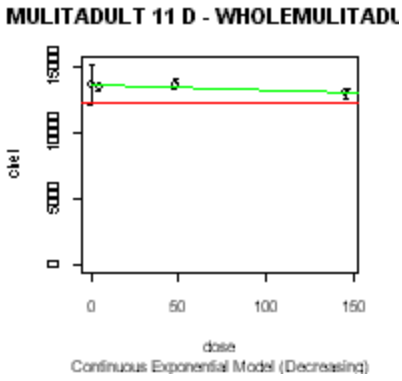
Summary of Model Fitting Results

```
      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

 Coefficients:
         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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.0003024
se: 0.000216
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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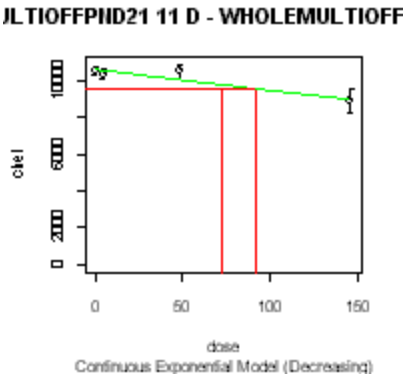
Summary of Model Fitting Results

```
      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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.001156
se: 0.0001785
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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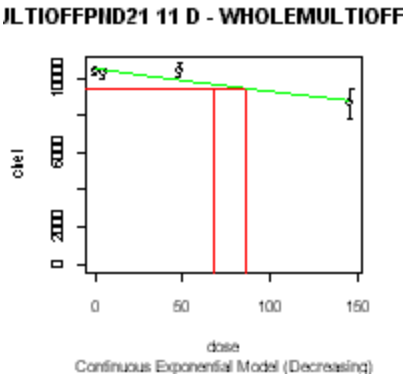
Summary of Model Fitting Results

```
      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

Potency Measures

A unit dose (1 mg/kg) would result in 100*exp(-Potency)% of background activity

Potency: 0.00123
se: 0.0002016
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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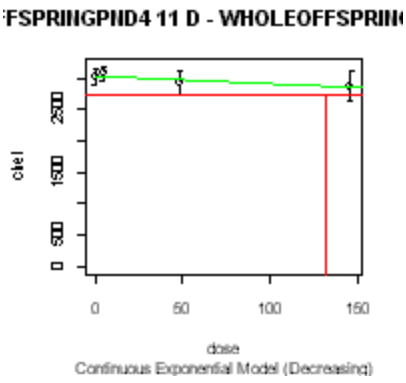
Summary of Model Fitting Results

```
      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*exp(-Potency)% of background activity

Potency: 0.0004223
se: 0.0002299
var=se^2: 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: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

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

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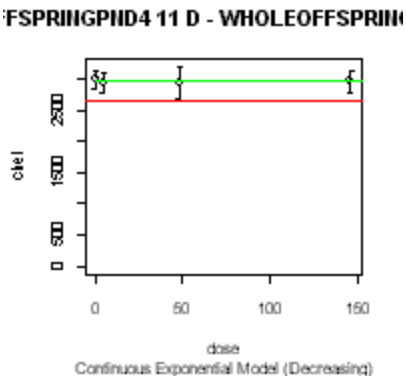
Summary of Model Fitting Results

```
      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*exp(-Potency)% of background activity

Potency: 5.137e-06
se: 0.0002615
var=se^2: 6.838e-08
Per cent. of background at unit dose: 100
Per cent. of background at the highest dose: 100
ED50 (95% CI): 134900 (6.246e-39 , 2.91499999999999e+48)

ln(Potency) -12.18
se[log(Potency)]: 50.91
se[log(Potency)]^2: 2592