Organophosphorus Cumulative Risk Assessment – 2006 Update

--- Continuation ----

August 2006

Appendices have been separated from the original PDF into individual PDF documents for viewing on-line.

This PDF contains the A & B appendices

II. Appendices for the 2006 Updated OP Cumulative Risk Assessment

A -1. Mitigation Summary for the OPs

Table II.A-1 Mitigation Summary for the OPs.

Decision Document	Use Site	Mitigation	Residential Uses Remaining
ACEPHATE			
9/2001 IRED	Residential Indoor Uses	**Cancelled**	Industrial buildings, institutional buildings, commercial buildings, golf courses, sod farms, fire ant and harvest ant (mound treatment), ornamental gardens
	Turf grass (except golf courses, sod farms, and post/or mound treatment for ant control)	**Cancelled**	
	Sod Farms (non- granular formulation)	Reduce maximum application rate to 3 lbs ai/A	
		Establish 3 day PHI	
	Golf Courses (non-granular formulation)	Reduce maximum application rate to 4 lbs ai/A	
	Turf - aerial application	**Cancelled**	
	Cotton- aerial application	CA and AZ: limit application rate to 1 lb ai/A	
		Rest of US: limit application rate to 0.75 ai/A	
	Greenhouse, floral and foliage plant crops, outdoor floral and ground covers	Reduce maximum application rate to 1 lb ai/ 100 gallons of water	
		Application not to exceed 0.75 lb ai/A	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Cut flowers	Reduce maximum application rate to 1 lb ai per 100 gallons of water	
		Application not to exceed 0.75 lb ai/A	
AZINPHOS-METHYL (AZM)			
10/2001 IRED	Group 1 Chemicals: Alfalfa, succulent beans, snap beans, birdsfoot trefoil, broccoli, cabbage, Chinese cabbage, cauliflower, citrus, celery, clover, cucumbers, eggplant, filberts, grapes, melons, green onions, dry bulb onions, pecans, plums and dried plums, quince, spinach, strawberries, tomatoes	**Cancelled**	None
	Group 2 Chemicals: Cotton, cranberries, nectarines, peaches, potatoes, southern pine seed orchards, caneberries	**Cancelled**	
2006 Decision (Notice of Availability of Proposed Decision published at 71 FR 33448)	Group 3 Chemicals: Almonds, nursery stock, parsley, pistachios, walnuts	**Phased-out by 2007**	
	Group 3 Chemicals: Apples, crab apples, pears, lowbush blueberries, highbush blueberries, sweet cherries, tart cherries, parsley	**Phased-out by 2010**	
BENSULIDE			

Decision Document	Use Site	Mitigation	Residential Uses Remaining
6/2000 IRED	Low-pressure hand-wands	Restrict use to spot treatments only	Golf Courses, Lawn Care
	Use on fairways	Restrict use to 1 application during the fall season	
		Restrict use to only bentgrass fairways, in only 18 states (OH, PA, NY, MI, CT, MA, IN, IL, NJ, WV, MN, WI, VT, NH, RI, DE, MD, VA)	
	Chemigation application method	Use limited to California and Arizona	
	Use on large turf areas in parks and recreational areas, and use on ornamentals	**Cancelled**	
CADUSAFOS-No Mitigation Necessary			
CHLORETHOXYPHOS-No Relevant Mitigation Necessary			
CHLORFENVINPHOS-All Uses Cancelled			
CHLORPYRIFOS			
6/2000 Memorandum of Agreement (MOA)	Residential uses with child exposure	**Cancelled**	Ant and roach baits
	Outdoor uses with child exposure	**Cancelled**	
	Termiticides	**Cancelled**	
	Post-Construction Uses	**Cancelled**	
	Pre-Construction Uses	**Cancelled**	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Tomatoes	**Cancelled**	
	Post-bloom uses on apples and grapes	**Cancelled**	
	Ant and roach baits	Must be sold in child-resistant packaging	
CHLORPYRIFOS-METHYL-No Relevant Mitigation Necessary			
CHLORTHIOPHOS-All Uses Cancelled			
COUMAPHOS			
8/1996 RED	Poultry	**Cancelled**	
DIALIFOR- All Uses Cancelled			
DIAZINON			
2001 MOA	Indoor and outdoor residential uses	**Cancelled**	None
7/2002 IRED	Chinese broccoli, Chinese cabbage, Chinese mustard, Chinese radish, corn, grapes, hops, sugar beets, walnuts, red beets, table beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, collards, endive, ginseng, kale, melons, mustard, bulb onions, green onions, radishes, spinach, sugar beets, sweet corn	**Cancelled**	
	Apples, pineapples	Maximum 2 applications per year	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Apricots, cherries, nectarines, peaches, pears, plums/prunes,	Maximum 1 application per growing season, every other year	
	Blueberries foliar application, figs, filberts (hazelnuts)	Maximum 1 application per year	
	Succulent beans, red beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, collards, endive, kale, mustard greens, onions, succulent peas, radishes, rutabagas, spinach, tomatoes	Maximum 1 application per year	
	Caneberries	Maximum 3 application per year	
	Ornamentals	Maximum 1 lb ai/A	
		Maximum 1 foliar application per crop	
	Strawberries, melons	Maximum 1 foliar application per crop	
		Maximum 1 soil application per crop	
	Ginseng, watercress	Maximum 1 foliar application per year	
	Lettuce	Liquid and wettable powder formulations: maximum 1 foliar application per year	
		Granular formulations: maximum 1 application at plant per crop	
DICROTOPHOS			
4/2002 IRED	Cotton	Total seasonal rate limited to 1 lb ai/A	Shade trees (this is a restricted

Decision Document	Use Site	Mitigation	Residential Uses Remaining
		Limit total use based on growth stages of cotton	use tree injection application, made by professional applicators, which would not result in residential exposures)
DIMETHOATE			
2000 MOA	All residential products	**Cancelled**	None
2005 Cancellation Order (70 FR 41717)	Apples, broccoli raab, cabbage, collards, grapes, head lettuce, spinach, fennel, lespedeza, tomatillo, trefoil	**Cancelled**	
6/2006 IRED	Cherries (SLN), citrus, pears	Maximum 1 lb ai/A per application	
		Maximum 1 application per year	
	Cherries	Maximum 0.33 lb ai/A per application	
		Maximum 2 applications per year	
		14 days application interval	
	Asparagus	Maximum 0.5 lb ai/A per application	
		Maximum 1 application per year	
	Alfalfa (seed and hay) field corn, popcorn, safflower, wheat	Maximum 0.5 lb ai/A per application	
		Maximum 1 application per year	
	Succulent peas	Maximum 0.16 lb ai/A per application	
		Maximum 1 application per year	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Fresh beans, snap beans, lima beans, dry beans, cotton	Maximum 0.5 lb ai/A per application	
		Maximum 2 applications per year	
		14 day application interval	
	Broccoli, cauliflower, Celery, Brussels sprouts	Maximum 0.5 lb ai/A per application	
		Maximum 3 applications per year	
		7 day application interval	
	Lentils, melon, potatoes, soybeans, sorghum	Maximum 0.5 lb ai/A per application	
		Maximum 2 applications per year	
		7 day application interval	
	Tomatoes	Maximum 0.5 lb ai/A per application	
		Maximum 2 applications per year	
		6 day application interval	
	Pecans, peppers	Maximum 0.33 lb ai/A per application	
		Maximum 3 applications per year	
		7 day application interval	
	Grass for seed	Maximum 0.5 lb ai/A per application	
		Maximum 2 applications per year	
		90 day application interval	
	Leaf lettuce, Swiss chard, Endive (escarole), turnips	Maximum 0.25 lb ai/A per application	
		Maximum 3 applications per year	
		7 day application interval	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Kale	Maximum 0.25 lb ai/A per application	
		Maximum 2 applications per year	
		15 day application interval	
	Mustard greens	Maximum 0.25 lb ai/A per application	
		Maximum 2 applications per year	
		9 day application interval	
	Herbaceous ornamentals	Maximum 0.25 lb ai/A per application	
		Maximum 1 application per year	
	Douglas fir seed orchards in Washington and Oregon	Maximum 4.15 lb ai/A per application	
		Maximum 1 application per year	
	Conifer seed orchards	Maximum 1.0 lb ai/A per application	
		Maximum 1 application per year	
	Woody ornamentals and Christmas tree nurseries	Maximum 1.0 lb ai/A per application	
		Maximum 3 applications per year	
		14 day application interval	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
DDVP			
6/2006 IRED	Cucumbers, lettuce, radishes, tomatoes, edible swine tissue	**Cancelled**	**Remaining Uses:** 16 gram pest strip 5.25 gram pest strip 10.5 gram pest strip Pet collars Indoor aerosol spray **The following are restricted to use only in unoccupied areas and dwellings that remain unoccupied for more than four months:** 65g pest strip 80g pest strip
	100 gram pest strip	**Cancelled**	
	21 gram pest strip		
	Total release fogger	**Cancelled**	
	Lawn, turf, ornamentals, crack, crevice	**Cancelled**	
	Mushroom house hand held fogger, Greenhouse hand held fogger, Warehouse hand held fogger	**Cancelled**	
DIOXATHION-All Uses Cancelled			
DISULFOTON			
3/2002 IRED	Barley, berries, corn, oats, pecans, potatoes, tomatoes, triticale, wheat	**Cancelled**	End use products containing less than 2% active ingredient (for use on ornamentals only)
	Home vegetable gardens	**Cancelled**	
	Most residential products	**Cancelled all residential products except those for use on ornamentals containing less than 2% active ingredient**	
	Cotton	No aerial application	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	EUP for Cotton Seed Treatment	**Cancelled**	
	Impregnated fertilizer spikes	**Cancelled**	
	Asparagus	Maximum 2 applications per year	
	Snap beans, lima beans	Maximum rate 1 lb ai/A	
	Cabbage	Prohibit chemigation application methods	
	Cole Crops, lettuce, peppers	Use in California only	
	Broccoli, cauliflower, peanuts,	Maximum 1 lb ai/A	
	Radishes grown for seed, clover grown for seed	Use in Washington only	
	Ornamentals (nurseries)	**Cancelled**	
	Christmas trees (limited to firs)	Maximum application rate 4.5 lb ai/A pear year	
ETHION-All Uses Cancelled			
ETHOPROP			
6/20002 IRED	Peanuts, snap beans, citrus seedlings, lima beans	**Cancelled**	None
	Golf course products	**Cancelled**	
ETHYL PARATHION-All Uses Cancelled			
FENAMIPHOS-All Uses Cancelled			

Decision Document	Use Site	Mitigation	Residential Uses Remaining
FENITROTHION-No Mitigation Necessary			
FENTHION-All Uses Cancelled			
FONOFOS-All Uses Cancelled			
FOSTHIAZATE-No Mitigation Necessary (New Active Ingredient)			
ISAZOPHOS-All Uses Cancelled			
ISOFENPHOS-All Uses Cancelled			
MALATHION			
7/2006 IRED	29 use sites	Rate Reductions	Homeowner fruit trees, homeowner ornamentals, homeowner vegetables/ small fruits, homeowner outdoor building perimeter treatments, outdoor yard
	70 use sites	Decreased the number of applications per year	
	Pet uses, indoor uses, greenhouse uses, broadcast turf	**Cancelled**	
	Pressurized can formulations, residential dust formulations	**Cancelled**	
METHAMIDOPHOS			
4/2002 IRED	Cotton	**Phased out by 2009**	None
METHIDATHION-No Relevant Mitigation Necessary			
METHYL PARATHION			

Decision Document	Use Site	Mitigation	Residential Uses Remaining
1999 Cancellation Order (64 FR 57877)	Apples, artichokes, broccoli, Brussels sprouts, carrots, cauliflower, celery, cherries, clover, collards, filberts, garden beets, grapes, kale, kohlrabi, lettuce, mustard greens, nectarines, peaches, pears, plums, rutabagas, sorghum, succulent beans, succulent peas, tomatoes, turnips, vetch	**Cancelled**	None
	Christmas trees, chrysanthemums, daisies, field grown ornamentals, flowering plants, forest, grasses grown for seed, guayule, jojoba, marigolds, any mosquito larvicide use, nursery stock, non-agricultural land, roadside areas, wasteland.	**Cancelled**	
3/2001 IRED	Cabbage, dried beans, dried peas, hops, lentils, pecans, sugar beets	**Cancelled**	
	Alfalfa	Maximum 1.0 lb ai/A per year	
		Maximum 6 application per year	
		PHI of 15 days	
	Almonds	Maximum 2.0 lb ai/A per year	
		Maximum 4 applications per year	
		PHI of 28 days	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Barley, oats, rice, and wheat	Maximum 0.75 lbs ai/A per year	
		Maximum 2 applications per year	
		PHI of 14 days	
	Corn (emulsifiable concentrate)	Maximum 0.5 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 12 days	
	Corn (microencapsulated formulations)	Maximum 1 lb ai/A per year	
		Maximum 3 applications per year	
		PHI of 12 days	
	Sweet Corn (emulsifiable concentrate formulations)	Maximum 0.5 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 12 days	
	Sweet corn (microencapsulated formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 4 applications per year	
		PHI of 12 days	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Cotton (emulsifiable concentrate formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 5 applications per year	
		PHI of 7 days	
	Cotton (microencapsulated formulations)	Maximum 1.0 lb ai/A per year	
		Maximum 4 applications per year	
		PHI of 14 days	
	Grasses grown for forage, fodder, hay, range) (emulsifiable concentrate formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 4 applications per year	
		PHI of 15 days	
	Onions (emulsifiable concentrate formulations)	Maximum 0.5 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 15 days	
	Onions (microencapsulated formulations)	Maximum 0.5 lb ai/a per year	
		Maximum 4 applications per year	
		PHI of 15 days	
	Rapeseed (canola)- emulsifiable concentrate formulations	Maximum 0.5 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 28 days	
	Rye (emulsifiable concentrate formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 2 applications per year	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
		PHI of 15 days	
	Soybeans (emulsifiable concentrate formulations)	Maximum 0.5 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 30 days	
	Soybeans (microencapsulated formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 30 days	
	Sunflower (emulsifiable concentrate formulations)	Maximum 1.0 lb ai/A per year	
		Maximum 2 applications per year	
		PHI of 30 days	
	Sweet potatoes and yams (microencapsulated formulations)	Maximum 0.75 lb ai/A per year	
		Maximum 8 applications per year	
		PHI of 5 days	
	Walnuts (microencapsulated formulations)	Maximum 2.0 lb ai/A per year	
		Maximum 4 applications per year	
		PHI of 14 days	
	White potatoes (emulsifiable concentrate formulations)	Maximum 0.75 lb ai/A per year	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
		Maximum 3 applications per year	
		PHI 5 days	
	White potatoes (microencapsulated formulations)	Maximum 1.5 l ai/A per year	
		Maximum 4 applications per year	
		PHI of 5 days	
MEVINPHOS-All Uses Cancelled			
MONOCROTOPHOS-All Uses Cancelled			
NALED			
1/2002 IRED	None	None	Black fly control, wide and general outdoor treatment of mosquitoes
OXYDEMETON- METHYL (ODM)			
8/2002 IRED	Field corn, pears, popcorn, snap beans, turnips	**Cancelled**	None
	Eggplants, bell peppers	**Cancelled (but tolerances will be retained for imports)**	
	Special Local Need use for Seed orchard trees in MT	**Cancelled**	
	Ornamentals in interior plant-scapes, ornamental gardens, parks, golf courses, lawns, grounds	**Cancelled**	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Alfalfa grown for seed	PHI of 21 days	
	Lima beans	Maximum 2 applications per crop cycle	
		PHI of 21 days	
	Sugar beets	Maximum 0.5 lb ai per crop cycle	
		Maximum 1 application per crop cycle	
		PHI of 30 days	
	Broccoli, broccoli raab, cauliflower	Maximum 2 applications per crop cycle	
		PHI of 7 days	
	Brussels sprouts	PHI of 10 days	
	Cabbage	PHI of 7 days	
	Carrots grown for seed	PHI of 21 days	
	Citrus: Oranges, lemons, grapefruit	PHI of 7 days	
	Special Local Need in FL		
	Clover grown for seed	PHI of 21 days	
	Sweet corn	Use restricted to west of the Rockies	
		Maximum 2 applications per crop cycle	
		PHI of 26 days	
	Cotton	Maximum 0.5 lb ai/A	
		1 application per crop cycle	
		Use restricted to CA and AZ	
		PHI of 14 days	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Cucurbits	Maximum 1 application per crop cycle	
		PHI of 14 days	
	Filberts	PHI of 116 days	
	Non-bearing fruit trees, apples, apricots, cherries, crab apples, nectarines, peaches, plums, prunes, quinces	Maximum 2 applications per crop cycle	
	Head lettuce	Maximum 2 applications per crop cycle	
		PHI of 21-28 days	
	Mint	PHI of 14 days	
	Spanish bulb onions	Maximum 0.5 lb/A	
		Maximum 2 applications per crop cycle	
		PHI of 30 days	
	Safflower	Maximum 0.5 lb/ A	
		Maximum 2 applications per crop cycle	
		PHI of 7 days	
	Sorghum	Maximum 2 applications per crop cycle	
		PHI of 45 day for grain sorghum	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
		PHI of 21 days for grazing sorghum	
	Strawberries (OR and WA special local need)	Maximum 2 application per crop cycle	
		No application to fruit	
	Walnuts	PHI of 30 days	
PHORATE			
3/2001 IRED	Wheat, peanuts	Prohibit use at pegging	None
PHOSALONE-No Mitigation necessary			
PHOSMET			
10/2001 IRED	Kiwifruit	PHI of 28 days	None
	Green Peas	PHI of 18 days	
	Lowbush blueberries	PHI of 7 days	
	Sweet cherries	Maximum 5.25 lb ai/A per year	
		PHI of 19 days	
	Tart cherries	Maximum 5.25 lb ai/A per year	
	Pears	Maximum application 4.0 lb ai/A	
		Maximum 11.2 lb ai/A pear year	
	Grapes: 1.0 lb ai/A application rate	Maximum 4.55 lb ai/A per year	
	Pistachios	Maximum 12 lb ai/A per year	

Decision Document	Use Site	Mitigation	Residential Uses Remaining
	Pecans	Maximum 7 lb ai/A per year	
	Walnuts	Maximum 12 lb ai/A per year	
	Filberts, brazil nuts, beechnuts, butternuts, cashew, chestnut, chinquapin, hickory nuts, macadamia nuts	Maximum 12 lb ai/A per year	
		PHI of 28 days	
	Residential uses- domestic pets, household ornamentals, household fruit trees	**Cancelled**	
PHOSPHAMIDON-All Uses Cancelled			
PHOSTEBUPIRIM-No Relevant Mitigation Necessary			
PRIMIPHOS METHYL-No Relevant Mitigation necessary			
PROFENOFOS-No Relevant Mitigation Necessary			
PROPETAMPHOS-No Relevant Mitigation Necessary			
SULFOTEPP-All Uses Cancelled			
SULPROFOS-All Uses Cancelled			
TEMEPHOS-No Relevant Mitigation Necessary (Mosquito larvicide use only)			
TERBUFOS			
9/2001 IRED	Sorghum	Maximum 1.70 lb ai/A	None
TETRACHLORVINPHOS			

Decision Document	Use Site	Mitigation	Residential Uses Remaining
12/2002 IRED			Cats, dogs, domestic indoor premises, spot treatments
TRIBUFOS			
12/2000 IRED	Cotton	1.125 lb ai/A in all states except California and Arizona	
TRICHLORFON			
9/2001 IRED	Ant mounds, house perimeter	**Cancelled**	Home lawns
	Golf courses	Maximum 3 applications per calendar year	
		Use on fairways limited to spot treatment	
	Golf courses- Broadcast and chemigation formulations	Limit to tees and greens	

B-1. Benchmark dose calculations for selected OPs from repeated dosing comparative ChE studies

Table II.B-1.1 Summary Table BMD Runs for Repeated Dosing from Comparative Cholinesterase Studies for Select OPs.

OP	Gender	Age	BMD	BMDL	P Value
Acephate	Male	Adult	0.274	0.224	0.023
		Pup	0.417	0.303	0.469
	Female	Adult	1.245	0.732	0.099
		Pup	1.127	0.597	0.59
Azinphos	Female	Adult	1.14	1.04	N/A
		Pup	0.25	0.22	
Diazinon	Male	Adult	40.57	27.87	0.537
		Pup	1.075	0.998	1.35E-06
	Female	Adult	0.385	0.29	0.646
		Pup	0.723	0.676	0.008
Disulfoton	Male	Adult	0.107	0.089	0.109
		Pup	0.048	0.045	0.021
	Female	Adult	0.066	0.055	0.044
		Pup	0.045	0.043	0.055
Dicrotophos	Male	Adult	0.109	0.085	0.228
		Pup	0.064	0.051	0.466
	Female	Adult	0.0867	0.0716	0.0198
		Pup	0.05	0.044	0.786
DDVP (Concurrent controls)	Male	Adult	0.72	0.55	0.71
		Pup	0.88	0.75	0.0081
	Female	Adult	0.88	0.71	0.84
		Pup	0.95	0.8	0.022
DDVP (Historical controls)	Male	Adult	0.77	0.62	0.63
		Pup	0.84	0.65	0.37
	Female	Adult	0.92	0.75	0.75
		Pup	0.85	0.62	0.39
Dimethoate	Male	Adult	0.484	0.218	0.866
		Pup	0.392	0.289	0.588
	Female	Adult	0.366	0.338	0.7
		Pup	0.408	0.261	0.812
Fosthiazate	Male	Adult	1.886	1.651	0.161

OP	Gender	Age	BMD	BMDL	P Value
		Pup	0.737	0.588	0.899
	Female	Adult	0.597	0.552	0.137
		Pup	0.477	0.436	0.278
Methamidophos	Male	Adult	0.103	0.083	0.112
		Pup	0.076	0.0605	0.552
	Female	Adult	0.181	0.112	0.091
		Pup	0.091	0.083	0.964
Methyl Parathion	Male	Adult	Poor fit		
		Pup	0.086	0.073	0.148
	Female	Adult	0.658	0.503	0.0002
		Pup	0.106	0.094	0.811
Phorate	Male	Pup	0.044	0.031	0.975
	Female	Pup	4015	0.07	1
Terbufos	Male	Adult	0.098	0.043	0.428
		Pup	0.015	0.013	0.573
	Female	Adult	0.015	0.008	0.562
		Pup	0.016	0.013	0.181

1. Acephate

a. Adult, Repeated

```
                    Acephate:11-D:BRAIN:F:WHOLE
                       Sun  Feb 17 20:03:43 2002
                MRID: 46151801Ad   Guideline: NONGUIDELINE
                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
161.51294 169.16103 -76.75647

Coefficients:
     Value Std.Error
A 8.011424 0.3448424
B 2.646285 2.2022807
m 0.129940 0.1094992

Correlation:
          A         B         m
A 1.0000000 0.6331860 0.6896269
B 0.6331860 1.0000000 0.9880074
m 0.6896269 0.9880074 1.0000000

Approximate 95% confidence intervals

 Coefficients:
       lower     est.      upper
A 7.34687854 8.011424  8.7360802
B 0.49606624 2.646285 14.1167128
m 0.02385034 0.129940  0.7079315

 Residual standard error:
   lower     est.    upper
1.236741 1.485630 1.860871

Degrees of freedom: 50 total; 47 residual
    ------------------------------------------------------------------
                            Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree
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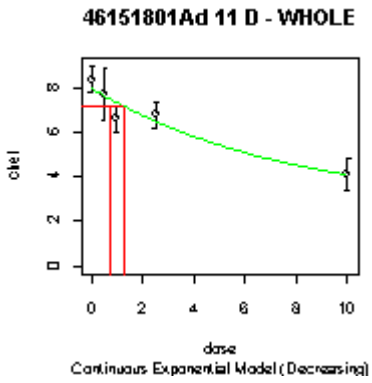


Pearson Chi-Square Statistic: 4.627 with 2 degrees of freedom. P = 0.099

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	8.41	8.011424	0.81	1.428793	0.88214790
2	0.5	10	7.72	7.673933	1.66	1.359658	0.10714137
3	1.0	10	6.63	7.357672	0.83	1.296091	-1.77541618
4	2.5	10	6.82	6.523326	0.86	1.134498	0.82694221
5	10.0	10	4.10	4.109334	1.01	0.730546	-0.04040200

BMD Computation

BMD = 1.245: BMDL = 0.7322

Potency Measures

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

Potency: 0.1299
se: 0.1095
var=se^2: 0.01199
Per cent. of background at unit dose: 88
Per cent. of background at the highest dose: 27
ED50 (95% CI): 5.334 (1.023 , 27.82)

ln(Potency) -2.041
se[log(Potency)]: 0.8427
se[log(Potency)]^2: 0.7101

Acephate:11-D:BRAIN:M:WHOLE
Sun Feb 17 20:05:10 2002
MRID: 46151801Ad Guideline: NONGUIDELINE
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

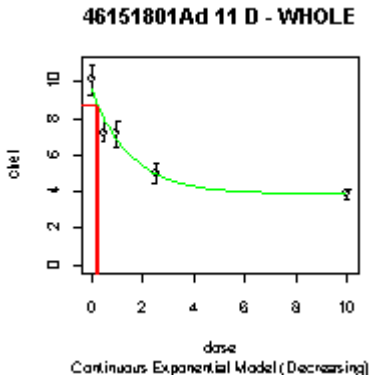
---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
131.89215 139.54024 -61.94608

Coefficients:
      Value  Std.Error
A 9.6420821 0.35366253
B 3.8842311 0.17198632
m 0.6679441 0.08848987

Correlation:
          A         B         m
A 1.0000000 0.1215402 0.6056173
B 0.1215402 1.0000000 0.5387317
m 0.6056173 0.5387317 1.0000000
```




```
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 8.9562204 9.6420821 10.380467
B 3.5532015 3.8842311  4.246101
m 0.5116738 0.6679441  0.871941

 Residual standard error:
   lower     est.    upper
1.144370 1.374670 1.721885

Degrees of freedom: 50 total; 47 residual
```

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 7.592 with 2 degrees of freedom. P = 0.0225

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	10.11	9.642082	1.21	1.3353162	1.1081169
2	0.5	10	7.23	8.007277	0.64	1.0850213	-2.2653624
3	1.0	10	7.15	6.836636	0.97	0.9136781	1.0845647
4	2.5	10	5.01	4.968281	0.82	0.6611181	0.1995515
5	10.0	10	3.87	3.891466	0.40	0.5422303	-0.1251876

```
-------------------------------------------------------------------
                        BMD Computation

                BMD = 0.2744:  BMDL = 0.2239

-------------------------------------------------------------------
                        Potency Measures

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

Potency: 0.6679
se: 0.08849
var=se^2: 0.00783
Per cent. of background at unit dose: 51
Per cent. of background at the highest dose: 0.13
ED50 (95% CI): 1.038 ( 0.8004 , 1.345 )

ln(Potency) -0.4036
se[log(Potency)]: 0.1325
```

se[log(Potency)]^2: 0.01755

b. Pup, Repeated

```
                    Acephate:11-D:BRAIN:F:WHOLE
                      Sun Feb 17 20:07:16 2002
              MRID: 46151806Pup   Guideline: NONGUIDELINE
               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
160.85705 168.50514 -76.42852

Coefficients:
      Value Std.Error
A 5.8213724 0.3485573
B 1.5350994 2.2279159
m 0.1294797 0.1387498

Correlation:
          A         B         m
A 1.0000000 0.6381198 0.6904093
B 0.6381198 1.0000000 0.9898527
m 0.6904093 0.9898527 1.0000000

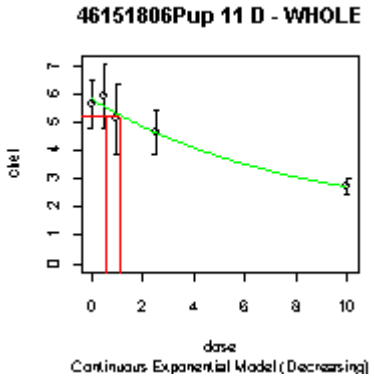
Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 5.16075137 5.8213724  6.566559
B 0.08282063 1.5350994 28.453420
m 0.01499557 0.1294797  1.117997

 Residual standard error:
   lower     est.    upper
1.222280 1.468260 1.839113

Degrees of freedom: 50 total; 47 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 1.057 with 2 degrees of freedom.  P =
0.59
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	5.63	5.821372	1.21	1.4418224	-0.419727664
2	0.5	10	5.92	5.552671	1.63	1.3765497	0.843845474
3	1.0	10	5.13	5.300815	1.74	1.3152118	-0.410704778
4	2.5	10	4.63	4.636080	1.11	1.1525052	-0.016681218
5	10.0	10	2.71	2.709338	0.38	0.6712756	0.003117330

BMD Computation

BMD = 1.127: BMDL = 0.5966

Potency Measures

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

Potency: 0.1295
se: 0.1387
var=se^2: 0.01925
Per cent. of background at unit dose: 88
Per cent. of background at the highest dose: 27
ED50 (95% CI): 5.353 (0.6553 , 43.73)

ln(Potency) -2.044
se[log(Potency)]: 1.072
se[log(Potency)]^2: 1.148

Acephate:11-D:BRAIN:M:WHOLE
Sun Feb 17 20:07:46 2002
MRID: 46151806Pup Guideline: NONGUIDELINE
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
138.52646 146.17455 -65.26323

Coefficients:
      Value Std.Error
A 6.2327529 0.3367764
B 2.2232011 0.1901778
m 0.4053003 0.0940682

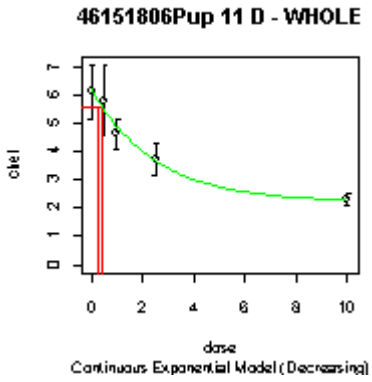
Correlation:
          A         B         m
A 1.0000000 0.2302019 0.6474848
B 0.2302019 1.0000000 0.6063487
m 0.6474848 0.6063487 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 5.5907703 6.2327529 6.9484537
B 1.8717224 2.2232011 2.6406816
m 0.2540963 0.4053003 0.6464807

 Residual standard error:
   lower     est.    upper
1.102686 1.324597 1.659164

Degrees of freedom: 50 total; 47 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 1.516 with 2 degrees of freedom. P = 0.469

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	6.14	6.232753	1.35	1.3462446	-0.21787306
2	0.5	10	5.82	5.497256	1.75	1.1862684	0.86034964
3	1.0	10	4.62	4.896676	0.79	1.0558512	-0.82864583
4	2.5	10	3.73	3.678816	0.77	0.7921963	0.20431435
5	10.0	10	2.29	2.292847	0.30	0.4949919	-0.01819131

BMD Computation

BMD = 0.4168: BMDL = 0.3031

Potency Measures

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

Potency: 0.4053
se: 0.09407
var=se^2: 0.008849
Per cent. of background at unit dose: 67
Per cent. of background at the highest dose: 1.7
ED50 (95% CI): 1.71 (1.085 , 2.695)

ln(Potency) -0.9031
se[log(Potency)]: 0.2321
se[log(Potency)]^2: 0.0538

2. Azinphos

a. Adult and Pup Repeated

Dose Response Modeling of Rat Brain AChE Activity: AZM in Adult and PND 11 Females

March 31, 2006

1 Preamble

Here is some code to set up the analysis: loading required libraries and datasets, and defining some functions.
Load the library DRUtils.

```
> library(DRUtils)
```

Set up lattice to use B&W instead of color:

```
> library(lattice)
> ltheme <- canonical.theme(color = FALSE)
> ltheme$strip.background$col <- "transparent"
> lattice.options(default.theme = ltheme)
```

Use package Hmisc for some formatting support.

```
> library(Hmisc)
```

The following function turns out to be quite useful on subsetted dataframes. It just eliminates unused levels of all factors in the data frame:

```
> CleanUp <- function(x) {
+     for (nm in names(x)) {
+         if (is.factor(x[, nm]))
+             x[, nm] <- factor(x[, nm])
+     }
+     x
+ }
```

To get starting values, we often have to extract values from a previously fit model. The following function simplifies that. The argument what is a regular expression:

```
> getParms <- function(what, Par) {
+     Par[grep(what, names(Par))]
+ }
```

This script is for modeling the dose-time response for rat brain via gavage dosing in both adult and juvenile females, and estimating the ratio of potencies in the two age groups.
First, read in the data from local ".csv" files:

```
> adult <- subset(read.csv("Adults.csv"), sex == "F" & compartment ==
+     "BRAIN")
> pnd11 <- subset(read.csv("pnd11.csv"), sex == "F" & compartment ==
+     "BRAIN")
```

Summary of the relevant variables in these datasets:

```
> adult[, c("dose", "chei", "sd", "n")]

   dose chei  sd n
6  0.00 13.8 0.5 6
7  0.25 14.4 0.3 6
8  0.54 13.5 0.6 6
9  1.00 13.3 0.5 6
10 1.60  5.2 2.4 6

> pnd11[, c("dose", "chei", "sd", "n")]

  dose chei  sd  n
5 0.00 10.4 0.3 12
6 0.24  9.6 0.4 12
7 0.51  7.4 0.9 11
8 1.00  4.8 1.0 11
```

Use PhonyDF() to set up a pseudo-individual dataset.

```
> adult.w <- with(adult, PhonyDF(dose, n, chei, sd, "dose", "chei"))
> pnd11.w <- with(pnd11, PhonyDF(dose, n, chei, sd, "dose", "chei"))
```

The model that has been fit to the carbamate data is:

$$\mathrm{E}(y) = A(1 - g(d; R, P, D, \gamma))$$

where

$$g(d; R, P, D, \gamma) = (1 - P)(1 - e^{ln(\frac{1-R-P}{1-P})(\frac{d}{D})^{\gamma}})$$

and

$$\begin{aligned} A &= e^{lA} \\ R &= \text{constant}: 0.1 \\ D &= e^{lD} \\ P &= \frac{1-R}{1+exp(-tz)} \\ \gamma &= e^{l\gamma} \end{aligned}$$

This is captured in the following R function:

```
> drfn <- function(x, lA, lD, lg, tz, R = 0.1) {
+     A <- exp(lA)
+     .exprP3 <- exp(-tz)
+     .exprP4 <- 1 + .exprP3
+     P <- (1 - R)/.exprP4
+     D <- exp(lD)
+     g <- exp(lg)
+     .expr1 <- 1 - P
+     .expr3 <- 1 - R - P
+     .expr4 <- .expr3/.expr1
+     .expr5 <- log(.expr4)
+     .expr6 <- x/D
+     .expr7 <- .expr6^g
+     .expr9 <- exp(.expr5 * .expr7)
```

```
+     .expr10 <- 1 - .expr9
+     .expr12 <- 1 - .expr1 * .expr10
+     .value <- A * .expr12
+     .grad <- array(0, c(length(.value), 4), list(NULL, c("lA",
+         "tz", "lD", "lg")))
+     .grad[, "lA"] <- .expr12 * A
+     .grad[, "tz"] <- ifelse(x > 0, -(A * (.expr1 * (.expr9 *
+         ((1/.expr1 - .expr3/.expr1^2)/.expr4 * .expr7)) - .expr10)) *
+         P * .exprP3/.exprP4, 0)
+     .grad[, "lD"] <- ifelse(x > 0, -(A * (.expr1 * (.expr9 *
+         (.expr5 * (.expr6^(g - 1) * (g * (x/D^2)))))) * D, 0)
+     .grad[, "lg"] <- ifelse(x > 0, A * (.expr1 * (.expr9 * (.expr5 *
+         (.expr7 * log(.expr6))))) * g, 0)
+     attr(.value, "gradient") <- .grad
+     .value
+ }
```

2 Dose-Response Modeling

The parameters of this model will be estimated using generalized non-linear least squares. First, we get initial parameter estimates for the two datasets. Preliminary work shows that we cannot estimate tz with these data sets, so set that value to -10, and estimate the remaining parameters.

```
> formals(drfn)$tz <- -10
> if (!file.exists("Inits.RData")) {
+     adultinits <- GetInitialValues(chei ~ drfn(dose, lA, lD,
+         lg), data = adult.w, params = list(lA ~ 1, lD ~ 1, lg ~
+         1), start = c(log(10), log(1), 0), weights = varIdent())
+     pnd11inits <- GetInitialValues(chei ~ drfn(dose, lA, lD,
+         lg), data = pnd11.w, params = list(lA ~ 1, lD ~ 1, lg ~
+         1), start = c(log(10), log(1), 0), weights = varIdent())
+     save(adultinits, pnd11inits, file = "Inits.RData")
+ } else {
+     load("Inits.RData")
+ }
```

Now fit the models. Modeling the variance is a problem: in both datasets, the variance *increases* as the response *decreases*. In the adult dataset, the highest dose has a substantially greater variance than the lower doses, whose standard deviations all look pretty similar. We can accommodate that by creating a factor that identifies that high dose, and using a construction like varIdent(1|varfact).

```
> adult.w$varfact <- factor(adult.w$dose == max(adult.w$dose))
> out.adult <- gnls(chei ~ drfn(dose, lA, lD, lg), data = adult.w,
+     params = list(lA ~ 1, lD ~ 1, lg ~ 1), start = adultinits$start$beta,
+     weights = varIdent(form = ~1 | varfact))
> summary(out.adult)

Generalized nonlinear least squares fit
  Model: chei ~ drfn(dose, lA, lD, lg)
  Data: adult.w
       AIC      BIC    logLik
  75.71114 82.71712 -32.85557

Variance function:
 Structure: Different standard deviations per stratum
```

```
 Formula: ~1 | varfact
 Parameter estimates:
   FALSE     TRUE
1.000000 3.995321

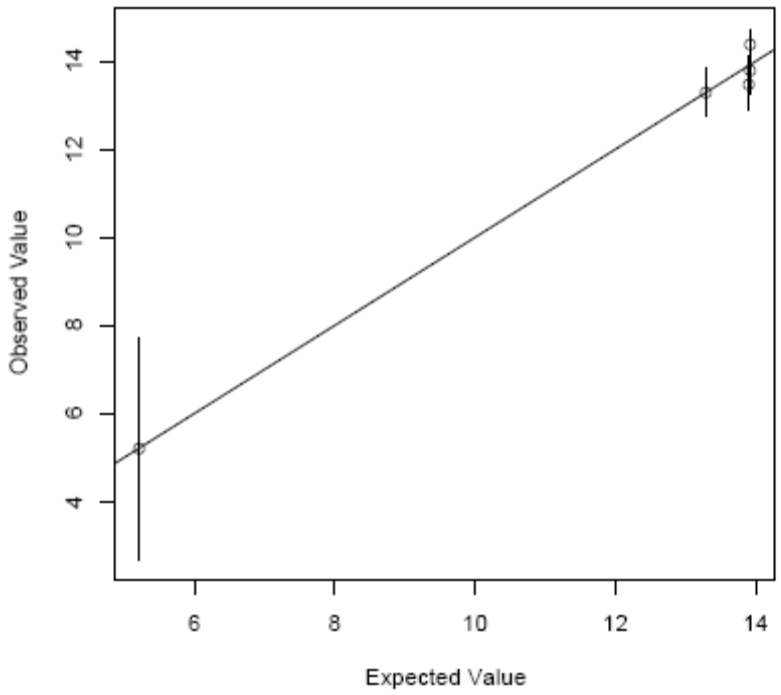
Coefficients:
      Value  Std.Error   t-value p-value
lA 2.632562 0.00993628 264.94447  0.0000
lD 0.127092 0.05080395   2.50162  0.0187
lg 1.872529 0.15650512  11.96465  0.0000

 Correlation:
   lA     lD
lD -0.504
lg -0.452  0.854

Standardized residuals:
        Min          Q1         Med          Q3         Max
-2.11659541 -0.72701486  0.04170518  0.70602499  1.66422738

Residual standard error: 0.5780485
Degrees of freedom: 30 total; 27 residual
```

Plot of observed versus predicted values, with 95% confidence intervals for the observed values. If we fit the data, this should form a diagonal line along the $x = y$ line.



This results in an estimate of the standard deviation in the lower doses of

```
> out.adult$sigma

[1] 0.5780485
```

and in the high dose of

```
> out.adult$sigma * exp(coef(out.adult$modelStruct))

varStruct
 2.309489
```

which compares favorably with the data.

In the PND11 dataset, the activity decreases more gradually with dose, while the standard deviation increases. Create a variable that is dose + 1, and try to fit a power model based on dose:

```
> pnd11.w$varval <- pnd11.w$dose + 1
> out.pnd11 <- gnls(chei ~ drfn(dose, lA, lD, lg), data = pnd11.w,
+     params = list(lA ~ 1, lD ~ 1, lg ~ 1), start = pnd11inits$start$beta,
+     weights = varPower(form = ~varval))
> summary(out.pnd11)
```

```
Generalized nonlinear least squares fit
  Model: chei ~ drfn(dose, lA, lD, lg)
  Data: pnd11.w
       AIC      BIC    logLik
  90.16405 99.30726 -40.08203

Variance function:
 Structure: Power of variance covariate
 Formula: ~varval
 Parameter estimates:
   power
2.012426

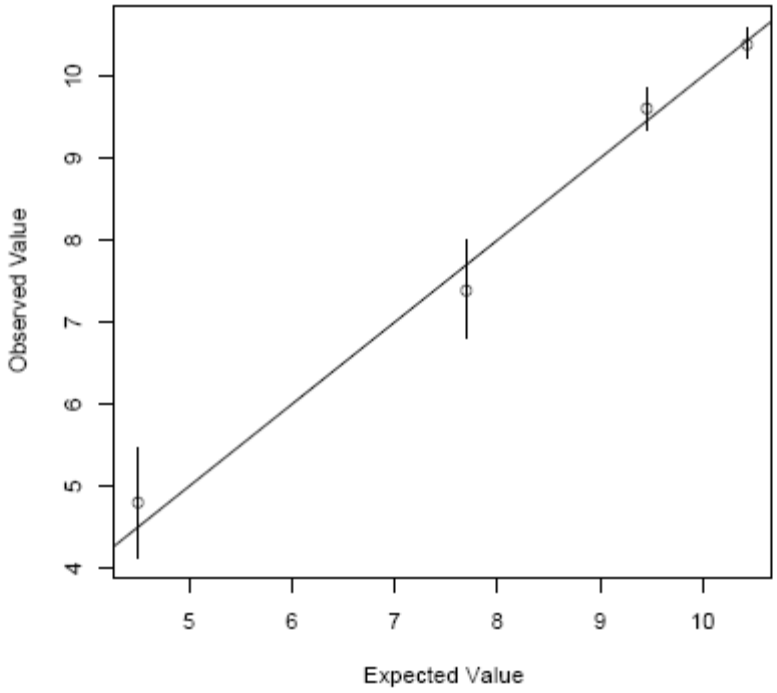
Coefficients:
        Value  Std.Error   t-value p-value
lA  2.3441899 0.00859987 272.58421       0
lD -1.3763981 0.09356099 -14.71124       0
lg  0.4104569 0.08879270   4.62264       0

 Correlation:
   lA     lD
lD -0.520
lg -0.376  0.873

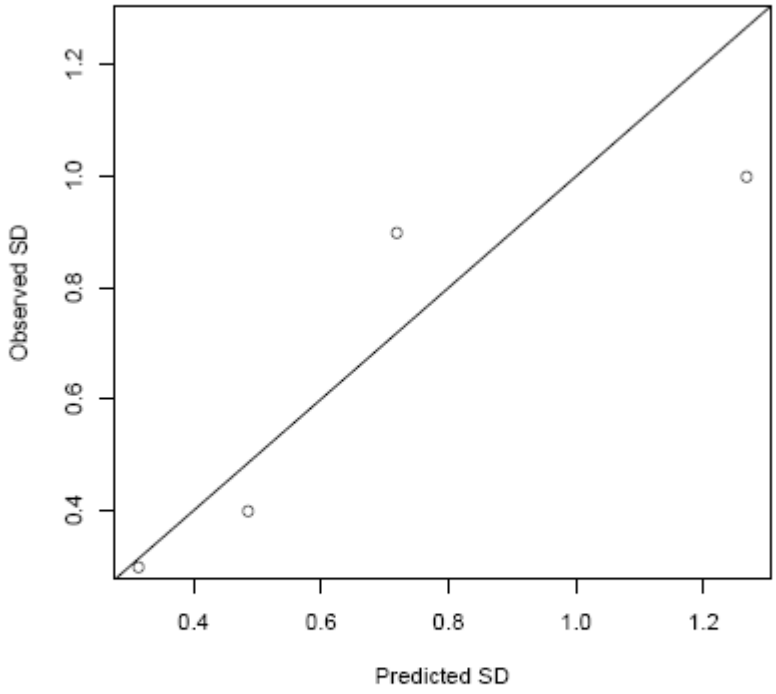
Standardized residuals:
        Min          Q1         Med          Q3         Max
-2.39204717 -0.61400771  0.01437606  0.66349105  1.88194994

Residual standard error: 0.3138989
Degrees of freedom: 46 total; 43 residual
```

Again, plots of observed versus predicted:

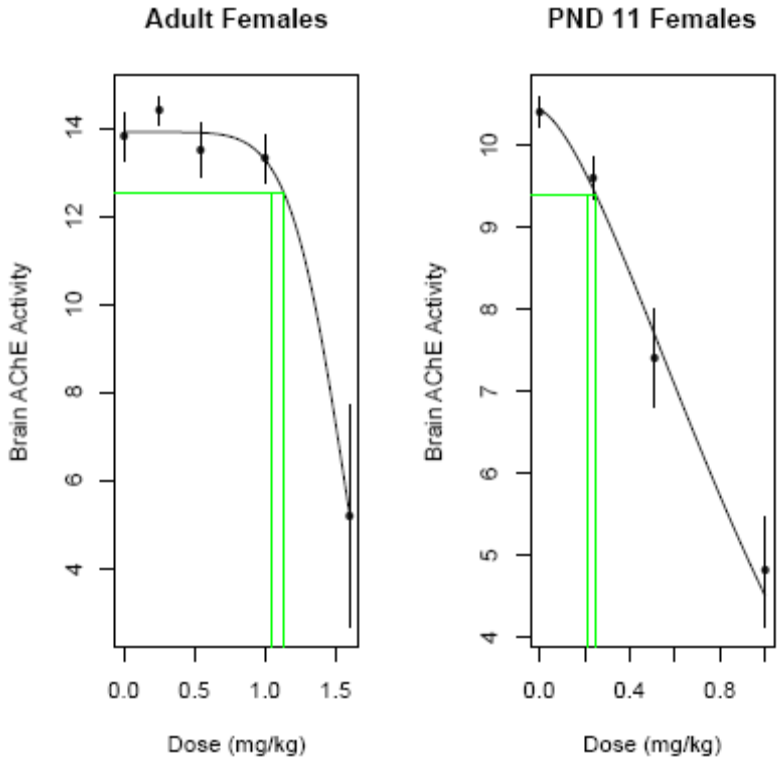


How well have we modeled the variance? Extract the standard deviations from the residual vector, and plot the observed standard deviations against them:



Again, the variance seems to be adequately modeled.

Finally, dose-response plots for both data sets (in the manner of BMDS):



3 Results

BMDs and BMDLs for adults and PND 11 females:

Age	BMD	BMDL	SE for ID
Adult	1.14	1.04	0.0508
PND 11	0.252	0.216	0.0936

This gives a relative potency between adults and pnd 11 pups of 4.5, with 95% confidence limits of (3.65, 5.54).

3. Diazinon

a. Adult, Repeated

```
                    DIAZINON:7-D:BRAIN:F:WHOLE
                      Fri Jan 04 17:11:44 1980
            MRID: 46166302SCAD7   Guideline: NONGUIDELINE
              Continuous Exponential Model (Decreasing)
              Formula: chei = B + (A-B)*exp(-(m*dose)^g)

Variance Function: power

Highest 2 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
 35.04058  38.57474 -14.52029

Coefficients:
      Value  Std.Error
A 13.251126 0.12562346
m  0.273804 0.05446239

Correlation:
          A         m
A 1.0000000 0.6319335
m 0.6319335 1.0000000

Approximate 95% confidence intervals

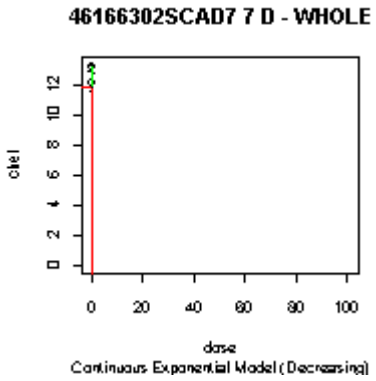
 Coefficients:
       lower      est.      upper
A 12.9931429 13.251126 13.5142307
m  0.1812538  0.273804  0.4136114

 Residual standard error:
    lower      est.     upper
0.3674626 0.4751294 0.6724751

Degrees of freedom: 24 total; 22 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.2108 with 1 degrees of freedom.  P =
0.646

  dose n chei Expected  sd    Exp.SD   X2 Resid.
1 0.00 8 13.2 13.25113 0.3 0.4769697 -0.30317490
```



```
2 0.03 8 13.2 13.14273 0.2 0.4730678  0.34244076
3 0.30 8 12.2 12.20617 0.7 0.4393567 -0.03970068

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 0.3848:  BMDL = 0.2899

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 0.2738
se: 0.05446
var=se^2: 0.002966
Per cent. of background at unit dose: 76
Per cent. of background at the highest dose: 92
ED50 (95% CI): 2.532 ( 1.714 , 3.739 )

ln(Potency) -1.295
se[log(Potency)]: 0.1989
se[log(Potency)]^2: 0.03957
```

DIAZINON:7-D:BRAIN:M:WHOLE
Fri Jan 04 17:11:50 1980
MRID: 46166302SCAD7 Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

```
       AIC        BIC     logLik
-0.5037806  3.8934271  3.2518903

Coefficients:
         Value    Std.Error
A 13.036335314 0.0469126357
m  0.002596825 0.0007193943

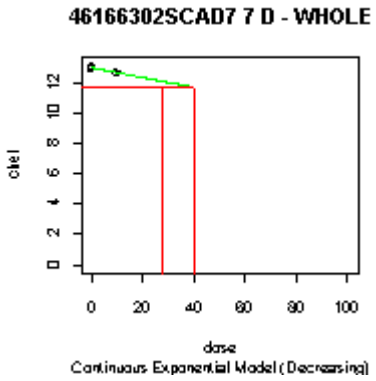
Correlation:
          A         m
A 1.0000000 0.5162654
m 0.5162654 1.0000000

Approximate 95% confidence intervals

 Coefficients:
         lower         est.        upper
A 12.940878133 13.036335314 13.132496625
m  0.001474799  0.002596825  0.004572486

 Residual standard error:
    lower      est.     upper
0.1825069 0.2283872 0.3052791

Degrees of freedom: 32 total; 30 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 1.244 with 2 degrees of freedom. P = 0.537

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	8	13.0	13.03634	0.3	0.2272773	-0.45218682
2	0.03	8	13.0	13.03532	0.2	0.2272596	-0.43958268
3	0.30	8	13.1	13.02618	0.2	0.2271003	0.91935170
4	10.00	8	12.7	12.70216	0.2	0.2214513	-0.02761669

BMD Computation

BMD = 40.57: BMDL = 27.87

Potency Measures

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

Potency: 0.002597
se: 0.0007194
var=se^2: 5.175e-07
Per cent. of background at unit dose: 100
Per cent. of background at the highest dose: 97
ED50 (95% CI): 266.9 (155.1 , 459.4)

ln(Potency) -5.953
se[log(Potency)]: 0.277
se[log(Potency)]^2: 0.07674

b. Pup, Repeated

```
                    DIAZINON:7-D:BRAIN:F:WHOLE
                      Fri Jan 04 17:12:04 1980
            MRID: 46166302SCPU17   Guideline: NONGUIDELINE
              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
    ------------------------------------------------------------------
                    Summary of Model Fitting Results

      AIC       BIC    logLik
 48.72852  53.79516 -21.36426

Coefficients:
      Value  Std.Error
A 9.9492415 0.09056042
m 0.1458177 0.00606255

Correlation:
         A        m
A 1.000000 0.550473
m 0.550473 1.000000

Approximate 95% confidence intervals

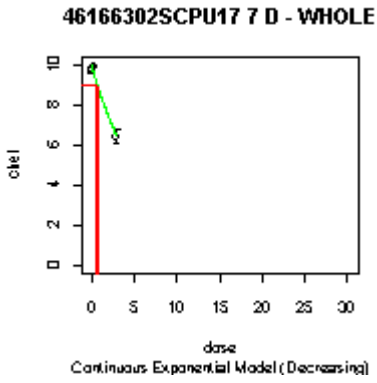
 Coefficients:
      lower      est.     upper
A 9.7675903 9.9492415 10.134271
m 0.1340470 0.1458177  0.158622

 Residual standard error:
    lower      est.     upper
0.3886845 0.4756029 0.6129466

Degrees of freedom: 40 total; 38 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 9.696 with 2 degrees of freedom.  P =
0.00784


  dose  n chei Expected  sd    Exp.SD  X2 Resid.
```



```
1 0.00 10  9.8 9.949242 0.2 0.4774077 -0.9885538
2 0.03 10  9.7 9.905813 0.2 0.4753511 -1.3691751
3 0.30 10  9.9 9.523391 0.2 0.4572359  2.6046545
4 3.00 10  6.4 6.424014 0.5 0.3100258 -0.2449468

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 0.7225:  BMDL = 0.6763

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 0.1458
se: 0.006063
var=se^2: 3.675e-05
Per cent. of background at unit dose: 86
Per cent. of background at the highest dose: 65
ED50 (95% CI): 4.754 ( 4.382 , 5.157 )

ln(Potency) -1.925
se[log(Potency)]: 0.04158
se[log(Potency)]^2: 0.001729
```

DIAZINON:7-D:BRAIN:M:WHOLE
Fri Jan 04 17:12:17 1980
MRID: 46166302SCPU17 Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
 29.88308  34.94972 -11.94154

Coefficients:
       Value   Std.Error
A 9.96431225 0.068802367
m 0.09800335 0.004590925

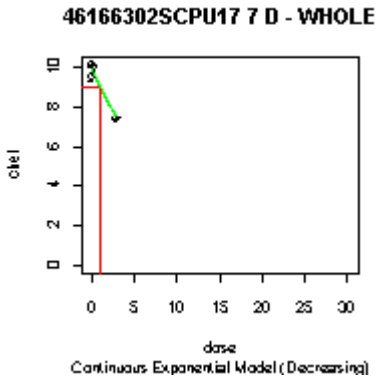
Correlation:
          A         m
A 1.0000000 0.5512196
m 0.5512196 1.0000000

Approximate 95% confidence intervals

 Coefficients:
       lower       est.      upper
A 9.82599808 9.96431225 10.1045734
m 0.08913658 0.09800335  0.1077521

 Residual standard error:
    lower      est.     upper
0.3007063 0.3679508 0.4742069

Degrees of freedom: 40 total; 38 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 27.03 with 2 degrees of freedom. P = 1.35e-06

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	10	9.5	9.964312	0.3	0.3627374	-4.0477888
2	0.03	10	10.1	9.935059	0.1	0.3616843	1.4421101
3	0.30	10	10.0	9.675616	0.2	0.3523434	2.9113406
4	3.00	10	7.4	7.426093	0.1	0.2712255	-0.3042235

WARNING: Predicted Standard Deviations deviate substantially from the observed ones!

```
------------------------------------------------------------------
                          BMD Computation

                  BMD = 1.075:  BMDL = 0.9982

------------------------------------------------------------------
                          Potency Measures

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

Potency: 0.098
se: 0.004591
var=se^2: 2.108e-05
Per cent. of background at unit dose: 91
Per cent. of background at the highest dose: 75
ED50 (95% CI): 7.073 ( 6.452 , 7.753 )

ln(Potency) -2.323
se[log(Potency)]: 0.04684
```

se[log(Potency)]^2: 0.002194

4. Dicrotophos

a. Adult, Repeated

```
                DICROTOPHOS:11-D:BRAIN:F:WHOLE
                    Fri Jan 04 12:53:17 1980
          MRID: 46153204RDAD48   Guideline: NONGUIDELINE
            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
 44.28351  47.94014 -19.14176

Coefficients:
     Value Std.Error
A 5.261217 0.1471595
m 1.215822 0.1553200

Correlation:
          A         m
A 1.0000000 0.5514934
m 0.5514934 1.0000000

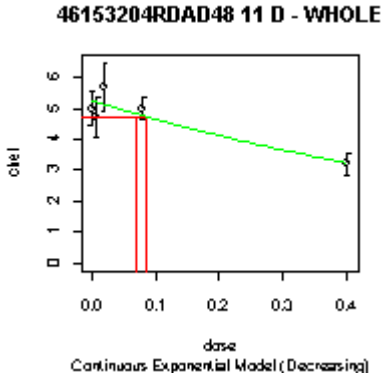
Approximate 95% confidence intervals

 Coefficients:
      lower     est.    upper
A 4.9654339 5.261217 5.574619
m 0.9334681 1.215822 1.583582

 Residual standard error:
    lower      est.     upper
0.5161955 0.6641617 0.9316598

Degrees of freedom: 25 total; 23 residual
    ------------------------------------------------------------------
                            Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 9.861 with 3 degrees of freedom.  P =
0.0198
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	5	5.01	5.261217	0.45	0.6107063	-0.9198163
2	0.008	5	4.70	5.210291	0.53	0.6050374	-1.8859093
3	0.020	5	5.70	5.134826	0.65	0.5966326	2.1181686
4	0.080	5	5.01	4.773580	0.30	0.5563278	0.9502513
5	0.400	5	3.19	3.235015	0.27	0.3831105	-0.2627336

BMD Computation

BMD = 0.08666: BMDL = 0.07161

Potency Measures

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

Potency: 1.216
se: 0.1553
var=se^2: 0.02412
Per cent. of background at unit dose: 30
Per cent. of background at the highest dose: 61
ED50 (95% CI): 0.5701 (0.4438 , 0.7323)

ln(Potency) 0.1954
se[log(Potency)]: 0.1277
se[log(Potency)]^2: 0.01632

DICROTOPHOS:11-D:BRAIN:M:WHOLE
Fri Jan 04 12:53:27 1980
MRID: 46153204RDAD48 Guideline: NONGUIDELINE
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
45.95487	49.61150	-19.97744

Coefficients:

	Value	Std.Error
A	4.9754007	0.1485699
m	0.9641208	0.1647604

Correlation:

	A	m
A	1.0000000	0.5535611
m	0.5535611	1.0000000

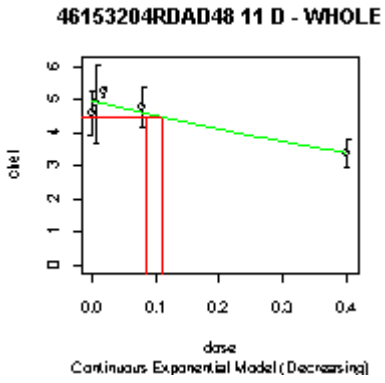
Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	4.6773605	4.9754007	5.292432
m	0.6770194	0.9641208	1.372972

Residual standard error:

lower	est.	upper
0.5061113	0.6511868	0.9134593



Degrees of freedom: 25 total; 23 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 4.33 with 3 degrees of freedom. P = 0.228

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	5	4.57	4.975401	0.54	0.6169182	-1.4694063
2	0.008	5	4.87	4.937173	0.97	0.6123144	-0.2453052
3	0.020	5	5.24	4.880382	0.13	0.6054729	1.3281027
4	0.080	5	4.75	4.606076	0.48	0.5723953	0.5622415
5	0.400	5	3.35	3.383320	0.34	0.4241992	-0.1756407

BMD Computation

BMD = 0.1093: BMDL = 0.0853

Potency Measures

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

Potency: 0.9641
se: 0.1648
var=se^2: 0.02715
Per cent. of background at unit dose: 38
Per cent. of background at the highest dose: 68
ED50 (95% CI): 0.7189 (0.5143 , 1.005)

ln(Potency) -0.03654
se[log(Potency)]: 0.1709
se[log(Potency)]^2: 0.0292

b. Pup, Repeated

```
                    DICROTOPHOS:11-D:BRAIN:F:WHOLE
                        Fri Jan 04 12:53:36 1980
                MRID: 46153204RDPU18   Guideline: NONGUIDELINE
                  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
 38.62325  42.27987 -16.31162

Coefficients:
     Value Std.Error
A 4.437535 0.1443560
m 2.125542 0.1795871

Correlation:
          A         m
A 1.0000000 0.5533875
m 0.5533875 1.0000000

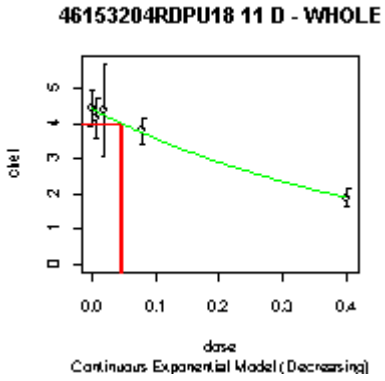
Approximate 95% confidence intervals

 Coefficients:
     lower     est.    upper
A 4.148739 4.437535 4.746436
m 1.784692 2.125542 2.531489

 Residual standard error:
    lower      est.     upper
0.4690526 0.6035055 0.8465737

Degrees of freedom: 25 total; 23 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 1.139 with 3 degrees of freedom.  P =
0.768
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	5	4.46	4.437535	0.41	0.5993913	0.08380527
2	0.008	5	4.14	4.362716	0.46	0.5894251	-0.84490522
3	0.020	5	4.41	4.252846	1.07	0.5747855	0.61137221
4	0.080	5	3.79	3.743630	0.29	0.5068645	0.20456332
5	0.400	5	1.89	1.896258	0.20	0.2591895	-0.05398726

BMD Computation

BMD = 0.04957: BMDL = 0.04352

Potency Measures

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

Potency: 2.126
se: 0.1796
var=se^2: 0.03225
Per cent. of background at unit dose: 12
Per cent. of background at the highest dose: 43
ED50 (95% CI): 0.3261 (0.2763 , 0.3848)

ln(Potency) 0.754
se[log(Potency)]: 0.08449
se[log(Potency)]^2: 0.007139

DICROTOPHOS:11-D:BRAIN:M:WHOLE
Fri Jan 04 12:53:44 1980
MRID: 46153204RDPU18 Guideline: NONGUIDELINE
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
63.67557	67.33220	-28.83779

Coefficients:

	Value	Std.Error
A	4.655131	0.2271053
m	1.641164	0.2680060

Correlation:

	A	m
A	1.000000	0.554989
m	0.554989	1.000000

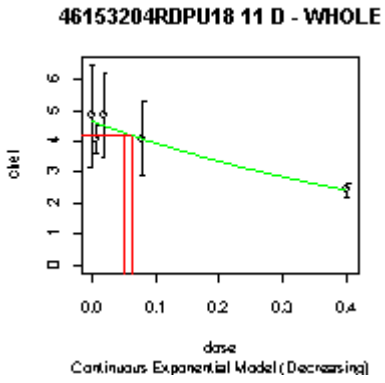
Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	4.208257	4.655131	5.149459
m	1.170685	1.641164	2.300721

Residual standard error:

lower	est.	upper
0.7645667	0.9837279	1.3799348



Degrees of freedom: 25 total; 23 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 2.554 with 3 degrees of freedom. P = 0.466

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	5	4.84	4.655131	1.34	0.9434034	0.43817865
2	0.008	5	4.06	4.594412	0.38	0.9311911	-1.28328282
3	0.020	5	4.85	4.504815	1.11	0.9131683	0.84525197
4	0.080	5	4.09	4.082367	0.95	0.8281537	0.02060974
5	0.400	5	2.41	2.414529	0.18	0.4917732	-0.02059499

BMD Computation

BMD = 0.0642: BMDL = 0.05061

Potency Measures

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

Potency: 1.641
se: 0.268
var=se^2: 0.07183
Per cent. of background at unit dose: 19
Per cent. of background at the highest dose: 52
ED50 (95% CI): 0.4224 (0.3067 , 0.5817)

ln(Potency) 0.4954
se[log(Potency)]: 0.1633
se[log(Potency)]^2: 0.02667

5. DDVP

a. Adult, Repeated, Concurrent

```
                        DDVP:7-D:BRAIN:F:WHOLE
                      Mon Apr 24 21:43:34 2006
               MRID: MDAdconc   Guideline: NONGUIDELINE
              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
25.51746 29.50039 -8.75873

Coefficients:
      Value  Std.Error
A 5.4680592 0.21623032
B 1.1331342 0.27076016
m 0.1529701 0.03053395

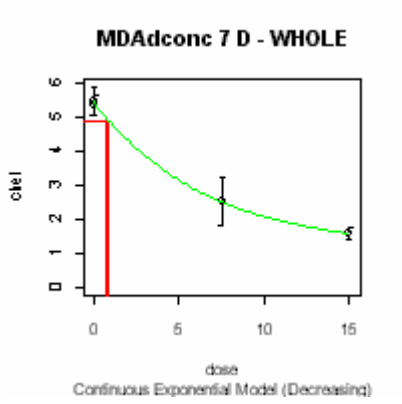
Correlation:
          A         B         m
A 1.0000000 0.1901865 0.3377826
B 0.1901865 1.0000000 0.9369459
m 0.3377826 0.9369459 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 5.0303656 5.4680592 5.9438367
B 0.6844438 1.1331342 1.8759659
m 0.1003945 0.1529701 0.2330789

 Residual standard error:
    lower      est.     upper
0.5119114 0.6821960 1.0227101

Degrees of freedom: 20 total; 17 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree
```



Pearson Chi-Square Statistic: 0.03915 with 1 degrees of freedom. P = 0.843

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	5	5.51	5.468059	0.34	0.6770768	0.138510867
2	0.1	5	5.36	5.402252	0.25	0.6689085	-0.141243990
3	7.5	5	2.51	2.509476	0.56	0.3104510	0.003776490
4	15.0	5	1.57	1.570124	0.15	0.1945313	-0.001419862

BMD Computation

BMD = 0.8814: BMDL = 0.713

Potency Measures

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

Potency: 0.153
se: 0.03053
var=se^2: 0.0009323
Per cent. of background at unit dose: 86
Per cent. of background at the highest dose: 10
ED50 (95% CI): 4.531 (3.064 , 6.701)

ln(Potency) -1.878
se[log(Potency)]: 0.1996
se[log(Potency)]^2: 0.03984

DDVP:7-D:BRAIN:M:WHOLE
Mon Apr 24 21:43:40 2006
MRID: MDAdconc Guideline: NONGUIDELINE
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

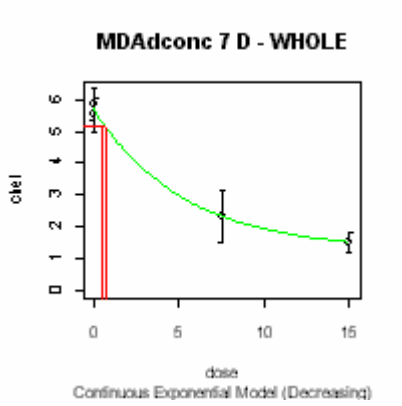
---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
 38.65735  42.64027 -15.32867

Coefficients:
      Value  Std.Error
A 5.7226764 0.31678214
B 1.2589525 0.25158074
m 0.1917306 0.04343782

Correlation:
          A         B         m
A 1.0000000 0.1403111 0.3067966
B 0.1403111 1.0000000 0.8887349
m 0.3067966 0.8887349 1.0000000
```




```
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 5.0918770 5.7226764 6.4316216
B 0.8258587 1.2589525 1.9191677
m 0.1188781 0.1917306 0.3092295

 Residual standard error:
    lower      est.     upper
0.7591362 1.0116588 1.5166222

Degrees of freedom: 20 total; 17 residual
```

Goodness of Fit

```
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.1429 with 1 degrees of freedom.  P =
0.705

  dose n chei Expected   sd    Exp.SD    X2 Resid.
1  0.0 5 5.84 5.722676 0.40 0.9917110  0.264536182
2  0.1 5 5.52 5.637908 0.42 0.9768860 -0.269889484
3  7.5 5 2.32 2.318672 0.68 0.4003437  0.007418733
4 15.0 5 1.51 1.510537 0.26 0.2624115 -0.004578106
```

```
------------------------------------------------------------------
                        BMD Computation

                  BMD = 0.7156:  BMDL = 0.551

------------------------------------------------------------------
                        Potency Measures

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

Potency: 0.1917
se: 0.04344
var=se^2: 0.001887
Per cent. of background at unit dose: 83
Per cent. of background at the highest dose: 5.6
ED50 (95% CI): 3.615 ( 2.319 , 5.636 )

ln(Potency) -1.652
se[log(Potency)]: 0.2266
```

se[log(Potency)]^2: 0.0513

b. Pup, Repeated, Concurrent

```
                    DDVP:7-D:BRAIN:F:WHOLE
                    Mon Apr 24 21:43:59 2006
          MRID: MDPupconc   Guideline: NONGUIDELINE
          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
    ------------------------------------------------------------------
                    Summary of Model Fitting Results

      AIC       BIC    logLik
 39.29316  41.41732 -16.64658

Coefficients:
      Value  Std.Error
A 5.8381055 0.33369886
m 0.1111981 0.01312090

Correlation:
          A         m
A 1.0000000 0.5883474
m 0.5883474 1.0000000

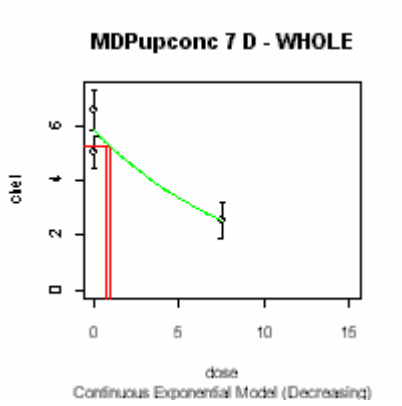
Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 5.15992657 5.8381055 6.6054187
m 0.08617663 0.1111981 0.1434846

 Residual standard error:
    lower      est.     upper
0.8565106 1.1814689 1.9033966

Degrees of freedom: 15 total; 13 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 5.215 with 1 degrees of freedom.  P =
0.0224
```



```
  dose n chei Expected   sd    Exp.SD   X2 Resid.
1  0.0 5 6.59 5.838105 0.59 1.0482540  1.60389304
2  0.1 5 5.02 5.773546 0.46 1.0365378 -1.62558583
3  7.5 5 2.54 2.535575 0.54 0.4511931  0.02192763

    ------------------------------------------------------------------
                            BMD Computation

                     BMD = 0.9475:  BMDL = 0.7935

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 0.1112
se: 0.01312
var=se^2: 0.0001722
Per cent. of background at unit dose: 89
Per cent. of background at the highest dose: 43
ED50 (95% CI): 6.233 ( 4.946 , 7.855 )

ln(Potency) -2.196
se[log(Potency)]: 0.118
se[log(Potency)]^2: 0.01392
```

DDVP:7-D:BRAIN:M:WHOLE
Mon Apr 24 21:44:06 2006
MRID: MDPupconc Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
 38.62180  40.74595 -16.31090

Coefficients:
      Value  Std.Error
A 6.2176817 0.33406064
m 0.1201434 0.01231365

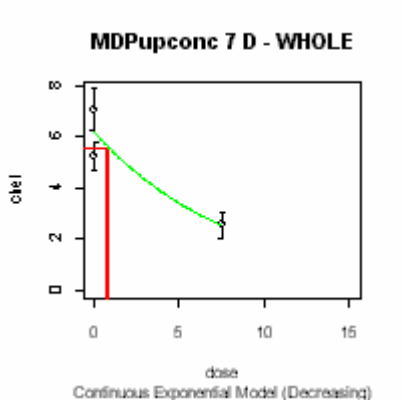
Correlation:
         A        m
A 1.000000 0.589248
m 0.589248 1.000000

Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 5.53629700 6.2176817 6.9829285
m 0.09628064 0.1201434 0.1499205

 Residual standard error:
    lower      est.     upper
0.8659536 1.1944947 1.9243816

Degrees of freedom: 15 total; 13 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 7.004 with 1 degrees of freedom. P = 0.00813

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	5	7.09	6.217682	0.64	1.0494073	1.85872816
2	0.1	5	5.27	6.143427	0.44	1.0367170	-1.88387271
3	7.5	5	2.53	2.525203	0.41	0.4213597	0.02545729

BMD Computation

BMD = 0.877: BMDL = 0.7504

Potency Measures

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

Potency: 0.1201
se: 0.01231
var=se^2: 0.0001516
Per cent. of background at unit dose: 89
Per cent. of background at the highest dose: 41
ED50 (95% CI): 5.769 (4.719 , 7.053)

ln(Potency) -2.119
se[log(Potency)]: 0.1025
se[log(Potency)]^2: 0.0105

c. Adult, Repeated, Historical

```
                    DDVP:7-D:BRAIN:F:WHOLE
                    Mon Apr 24 21:43:45 2006
          MRID: MDAdhist   Guideline: NONGUIDELINE
        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
 64.04178  70.79730 -28.02089

Coefficients:
      Value  Std.Error
A 5.3368308 0.11905590
B 1.0997356 0.28281397
m 0.1465709 0.02915622

Correlation:
          A         B         m
A 1.0000000 0.1150917 0.2036726
B 0.1150917 1.0000000 0.9481542
m 0.2036726 0.9481542 1.0000000

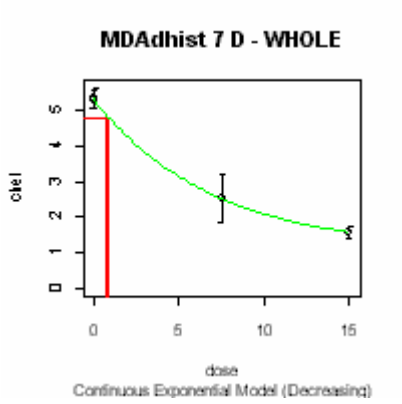
Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 5.10097136 5.3368308 5.5835960
B 0.65311837 1.0997356 1.8517598
m 0.09794975 0.1465709 0.2193271

 Residual standard error:
    lower      est.     upper
0.5322331 0.6528354 0.8446040

Degrees of freedom: 40 total; 37 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.104 with 1 degrees of freedom.  P =
0.747
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	25	5.32	5.336831	0.60	0.6499687	-0.129474129
2	0.1	5	5.36	5.275180	0.25	0.6424933	0.295197982
3	7.5	5	2.51	2.511155	0.56	0.3062988	-0.008433535
4	15.0	5	1.57	1.569894	0.15	0.1909515	0.001242926

BMD Computation

BMD = 0.9185: BMDL = 0.7518

Potency Measures

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

Potency: 0.1466
se: 0.02916
var=se^2: 0.0008501
Per cent. of background at unit dose: 86
Per cent. of background at the highest dose: 11
ED50 (95% CI): 4.729 (3.202 , 6.984)

ln(Potency) -1.92
se[log(Potency)]: 0.1989
se[log(Potency)]^2: 0.03957

DDVP:7-D:BRAIN:M:WHOLE
Mon Apr 24 21:43:52 2006
MRID: MDAdhist Guideline: NONGUIDELINE
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
 78.62698  85.38250 -35.31349

Coefficients:
      Value  Std.Error
A 5.4406635 0.14572755
B 1.2233684 0.23205212
m 0.1793503 0.03602974

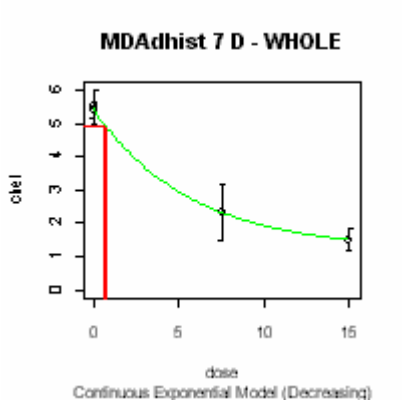
Correlation:
           A          B         m
A 1.00000000 0.08852252 0.1851917
B 0.08852252 1.00000000 0.9107214
m 0.18519170 0.91072141 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 5.1532609 5.4406635 5.7440950
B 0.8329963 1.2233684 1.7966830
m 0.1193784 0.1793503 0.2694501

 Residual standard error:
    lower      est.     upper
0.6580918 0.8072133 1.0443300

Degrees of freedom: 40 total; 37 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.2307 with 1 degrees of freedom. P = 0.631

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	25	5.41	5.440664	0.61	0.7954922	-0.192733152
2	0.1	5	5.52	5.365700	0.42	0.7846436	0.439720961
3	7.5	5	2.32	2.322001	0.68	0.3407920	-0.013132451
4	15.0	5	1.51	1.509570	0.26	0.2200316	0.004374445

BMD Computation

BMD = 0.7701: BMDL = 0.6168

Potency Measures

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

Potency: 0.1794
se: 0.03603
var=se^2: 0.001298
Per cent. of background at unit dose: 84
Per cent. of background at the highest dose: 6.8
ED50 (95% CI): 3.865 (2.607 , 5.73)

ln(Potency) -1.718
se[log(Potency)]: 0.2009
se[log(Potency)]^2: 0.040

d. Pup, Repeated, Historical

```
                    DDVP:7-D:BRAIN:F:WHOLE
                    Mon Apr 24 21:44:12 2006
          MRID: MDPuphist   Guideline: NONGUIDELINE
          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
 91.73904  98.07312 -41.86952

Coefficients:
      Value  Std.Error
A 5.4535860 0.20843990
B 1.3874190 0.37759636
m 0.1686908 0.05235096

Correlation:
          A         B         m
A 1.0000000 0.0969725 0.1952096
B 0.0969725 1.0000000 0.9213612
m 0.1952096 0.9213612 1.0000000

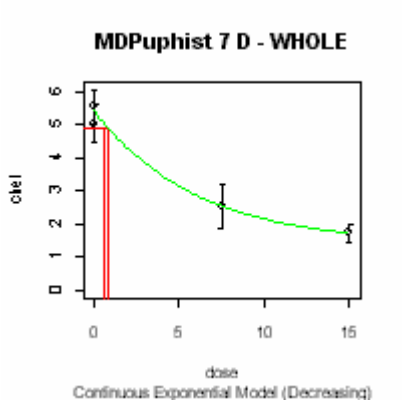
Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 5.04558081 5.4535860 5.8945841
B 0.79750815 1.3874190 2.4136825
m 0.08971903 0.1686908 0.3171746

 Residual standard error:
   lower     est.    upper
0.867120 1.075062 1.415080

Degrees of freedom: 36 total; 33 residual
    ------------------------------------------------------------------
                             Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.7522 with 1 degrees of freedom.  P =
0.386
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	21	5.54	5.453586	1.18	1.0587084	0.374039299
2	0.1	5	5.02	5.385569	0.46	1.0451764	-0.782104088
3	7.5	5	2.54	2.534843	0.54	0.4881430	0.023622823
4	15.0	5	1.71	1.711208	0.22	0.3342521	-0.008084159

BMD Computation

BMD = 0.8537: BMDL = 0.6228

Potency Measures

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

Potency: 0.1687
se: 0.05235
var=se^2: 0.002741
Per cent. of background at unit dose: 84
Per cent. of background at the highest dose: 8
ED50 (95% CI): 4.109 (2.237 , 7.549)

ln(Potency) -1.78
se[log(Potency)]: 0.3103
se[log(Potency)]^2: 0.09631

DDVP:7-D:BRAIN:M:WHOLE
Mon Apr 24 21:44:18 2006
MRID: MDPuphist Guideline: NONGUIDELINE
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
90.63050	97.28474	-41.31525

Coefficients:

	Value	Std.Error
A	5.6883165	0.17732604
B	1.1782553	0.33427136
m	0.1610776	0.03905932

Correlation:

	A	B	m
A	1.0000000	0.1065217	0.2028358
B	0.1065217	1.0000000	0.9324765
m	0.2028358	0.9324765	1.0000000

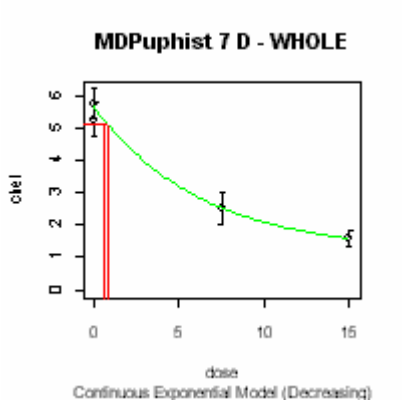
Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	5.33981535	5.6883165	6.059562
B	0.66276419	1.1782553	2.094690
m	0.09850411	0.1610776	0.263400

Residual standard error:

lower	est.	upper
0.7834716	0.9634302	1.2514578



Degrees of freedom: 39 total; 36 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.8159 with 1 degrees of freedom. P = 0.366

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	24	5.76	5.688316	1.05	0.9517421	0.36898250
2	0.1	5	5.27	5.616251	0.44	0.9394402	-0.82415231
3	7.5	5	2.53	2.525726	0.41	0.4194838	0.02278489
4	15.0	5	1.58	1.580839	0.21	0.2660983	-0.00704853

BMD Computation

BMD = 0.837: BMDL = 0.6514

Potency Measures

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

Potency: 0.1611
se: 0.03906
var=se^2: 0.001526
Per cent. of background at unit dose: 85
Per cent. of background at the highest dose: 8.9
ED50 (95% CI): 4.303 (2.675 , 6.921)

ln(Potency) -1.826
se[log(Potency)]: 0.2425
se[log(Potency)]^2: 0.0588

6. Dimethoate

a. Adult, Repeated

```
                    DIMETHOATE:11-D:BRAIN:F:WHOLE
                      Wed Aug 18 18:39:56 2004
                MRID: 45529702   Guideline: NONGUIDELINE
               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
 546.8830  551.2802 -270.4415

Coefficients:
         Value     Std.Error
A 1.467991e+04 331.88894597
m 2.875262e-01   0.01490362

Correlation:
          A         m
A 1.0000000 0.5903737
m 0.5903737 1.0000000

Approximate 95% confidence intervals

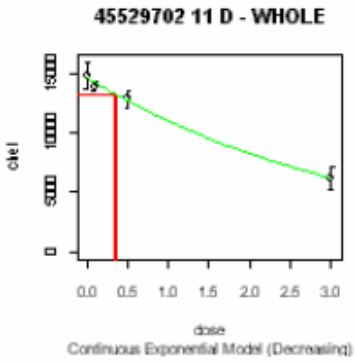
 Coefficients:
         lower         est.        upper
A 1.401751e+04 1.467991e+04 1.537360e+04
m 2.586446e-01 2.875262e-01 3.196329e-01

 Residual standard error:
   lower     est.    upper
1225.850 1534.016 2050.478

Degrees of freedom: 32 total; 30 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.7123 with 2 degrees of freedom.  P =
0.7

  dose n      chei  Expected        sd    Exp.SD   X2 Resid.
1  0.0 8 14868.75 14679.905 1399.7289 1513.3442  0.35294916
2  0.1 8 13912.50 14263.830  446.2142 1470.6675 -0.67568682
3  0.5 8 12881.25 12714.161  845.1278 1311.6610  0.36030474
4  3.0 8  6187.50  6195.981 1077.6131  641.5657 -0.03738933
```



BMD Computation

BMD = 0.3664: BMDL = 0.3377

Potency Measures

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

Potency: 0.2875
se: 0.0149
var=se^2: 0.0002221
Per cent. of background at unit dose: 75
Per cent. of background at the highest dose: 42
ED50 (95% CI): 2.411 (2.178 , 2.669)

ln(Potency) -1.246
se[log(Potency)]: 0.05183
se[log(Potency)]^2: 0.002687

DIMETHOATE:11-D:BRAIN:M:WHOLE
Wed Aug 18 18:40:01 2004
MRID: 45529702 Guideline: NONGUIDELINE
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
 580.8117  586.6747 -286.4059

Coefficients:
         Value     Std.Error
A 1.418582e+04 6.693422e+02
B 6.934757e+02 2.463564e+04
m 2.295838e-01 6.112029e-01

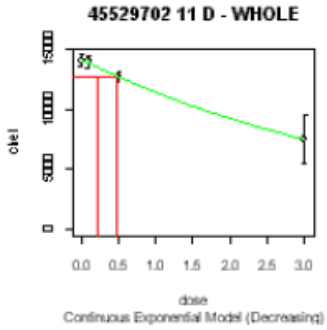
Correlation:
          A         B         m
A 1.0000000 0.6252848 0.6441556
B 0.6252848 1.0000000 0.9990744
m 0.6441556 0.9990744 1.0000000

Approximate 95% confidence intervals

 Coefficients:
         lower          est.         upper
A 1.288084e+04 1.418582e+04 1.562301e+04
B 1.935073e-29 6.934757e+02 2.485221e+34
m 9.914506e-04 2.295838e-01 5.316323e+01

 Residual standard error:
   lower     est.    upper
1881.485 2362.467 3175.900

Degrees of freedom: 32 total; 29 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.02856 with 1 degrees of freedom. P = 0.866

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	8	14100.00	14185.82	529.1503	2376.373	-0.102149399
2	0.1	8	13987.50	13879.59	661.5728	2325.356	0.131255835
3	0.5	8	12700.00	12722.60	547.7226	2132.402	-0.029977672
4	3.0	8	7468.75	7469.37	2484.3708	1251.247	-0.001401282

BMD Computation

BMD = 0.4839: BMDL = 0.2183

Potency Measures

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

Potency: 0.2296
se: 0.6112
var=se^2: 0.3736
Per cent. of background at unit dose: 79
Per cent. of background at the highest dose: 50
ED50 (95% CI): 3.019 (0.01636 , 557.2)

ln(Potency) -1.471
se[log(Potency)]: 2.662
se[log(Potency)]^2: 7.087

b. Pup, Repeated

```
                    DIMETHOATE:11-D:BRAIN:F:WHOLE
                       Wed Aug 18 20:12:24 2004
                 MRID: 45529702   Guideline: NONGUIDELINE
               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
 517.114  522.977 -254.557

Coefficients:
         Value     Std.Error
A 1.023172e+04   244.4269786
B 4.761725e+03  1434.4099641
m 5.070756e-01     0.3102889

Correlation:
          A         B         m
A 1.0000000 0.5727942 0.6245823
B 0.5727942 1.0000000 0.9863055
m 0.6245823 0.9863055 1.0000000

Approximate 95% confidence intervals

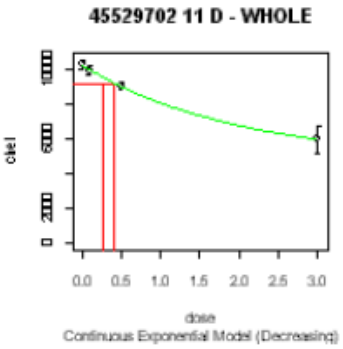
 Coefficients:
         lower          est.         upper
A 9743.8245469 1.023172e+04 10744.040990
B 2571.5535403 4.761725e+03  8817.247872
m    0.1450599 5.070756e-01     1.772549

 Residual standard error:
    lower      est.     upper
 689.2430  865.4407 1163.4250

Degrees of freedom: 32 total; 29 residual
    ------------------------------------------------------------------
                                Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.05658 with 1 degrees of freedom.  P =
0.812

  dose n     chei  Expected       sd   Exp.SD    X2 Resid.
1  0.0 8 10275.00 10231.718 376.0699 861.9491  0.142027400
2  0.1 8  9906.25  9961.263 313.3204 839.0650 -0.185444384
3  0.5 8  9018.75  9006.715 247.7578 758.3745  0.044884938
4  3.0 8  5956.25  5956.611 964.8973 501.7452 -0.002033078
```



BMD Computation

BMD = 0.4084: BMDL = 0.2609

Potency Measures

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

Potency: 0.5071
se: 0.3103
var=se^2: 0.09628
Per cent. of background at unit dose: 60
Per cent. of background at the highest dose: 22
ED50 (95% CI): 1.367 (0.412 , 4.536)

ln(Potency) -0.6791
se[log(Potency)]: 0.6119
se[log(Potency)]^2: 0.3744

DIMETHOATE:11-D:BRAIN:M:WHOLE
Wed Aug 18 20:12:31 2004
MRID: 45529702 Guideline: NONGUIDELINE
Continuous Exponential Model (Decreasing)
Formula: chei = B + (A-B)*exp(-(m*dose)^g)

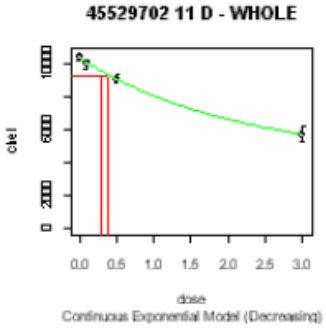
Variance Function: power

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
 490.4541  496.3170 -241.2270
```



Coefficients:

```
         Value     Std.Error
A 1.030886e+04  163.3439882
B 4.209439e+03 1128.3793005
m 4.723459e-01    0.1929238
```

Correlation:

```
          A         B         m
A 1.0000000 0.5845660 0.6296056
B 0.5845660 1.0000000 0.9903008
m 0.6296056 0.9903008 1.0000000
```

Approximate 95% confidence intervals

Coefficients:

```
         lower          est.         upper
A 9980.1364087 1.030886e+04 10648.405296
B 2432.9062934 4.209439e+03  7283.213837
m    0.2048675 4.723459e-01     1.089049
```

Residual standard error:

```
   lower     est.    upper
462.2901 580.4697 780.3343
```

Degrees of freedom: 32 total; 29 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.2933 with 1 degrees of freedom. P = 0.588

```
  dose n      chei  Expected       sd   Exp.SD    X2 Resid.
1  0.0 8 10375.00 10308.857 207.0197 576.9300  0.324268111
2  0.1 8  9943.75 10027.452 331.0562 561.0777 -0.421947102
3  0.5 8  9043.75  9025.808 339.5769 504.7310  0.100541175
4  3.0 8  5687.50  5688.128 566.7892 318.2699 -0.005577083
```

BMD Computation

BMD = 0.392: BMDL = 0.2888

Potency Measures

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

Potency: 0.4723
se: 0.1929
var=se^2: 0.03722
Per cent. of background at unit dose: 62
Per cent. of background at the highest dose: 24
ED50 (95% CI): 1.467 (0.659 , 3.268)

ln(Potency) -0.75
se[log(Potency)]: 0.4084
se[log(Potency)]^2: 0.1668

7. Disulfoton

a. Adult, Repeated

```
                    DISULFOTON:11-D:BRAIN:F:WHOLE
                        Fri Jan 04 19:39:29 1980
                MRID: 46637101RPAD11   Guideline: NONGUIDELINE
                  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
    ------------------------------------------------------------------
                        Summary of Model Fitting Results

      AIC       BIC    logLik
 48.50618  51.17729 -21.25309

Coefficients:
      Value Std.Error
A 11.915915 0.3775353
m  1.606323 0.1980217

Correlation:
          A         m
A 1.0000000 0.7701856
m 0.7701856 1.0000000

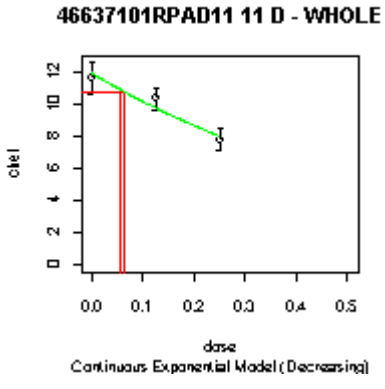
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 11.141862 11.915915 12.743744
m  1.236907  1.606323  2.086070

 Residual standard error:
    lower      est.     upper
0.7384417 0.9915032 1.5089975

Degrees of freedom: 18 total; 16 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 4.066 with 1 degrees of freedom.  P =
0.0438
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	6	11.58	11.915915	0.912	1.0109023	-0.8139474
2	0.125	6	10.31	9.748218	0.650	0.8358384	1.6463453
3	0.250	6	7.74	7.974860	0.680	0.6910914	-0.8324332

BMD Computation

BMD = 0.06559: BMDL = 0.05453

Potency Measures

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

Potency: 1.606
se: 0.198
var=se^2: 0.03921
Per cent. of background at unit dose: 20
Per cent. of background at the highest dose: 67
ED50 (95% CI): 0.4315 (0.3389 , 0.5494)

ln(Potency) 0.4739
se[log(Potency)]: 0.1233
se[log(Potency)]^2: 0.0152

DISULFOTON:11-D:BRAIN:M:WHOLE
Fri Jan 04 19:39:39 1980
MRID: 46637101RPAD11 Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
 54.02910  56.70022 -24.01455

Coefficients:
      Value Std.Error
A 11.774107 0.4600004
m  0.986816 0.1223086

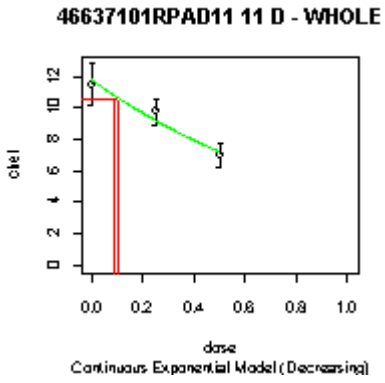
Correlation:
          A         m
A 1.0000000 0.7692694
m 0.7692694 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 10.838240 11.774107 12.790785
m  0.758799  0.986816  1.283351

 Residual standard error:
    lower      est.     upper
0.9013439 1.2102315 1.8418863

Degrees of freedom: 18 total; 16 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 2.564 with 1 degrees of freedom. P = 0.109

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	6	11.45	11.774107	1.267	1.2311843	-0.6448243
2	0.25	6	9.72	9.199957	0.796	0.9744274	1.3072697
3	0.50	6	6.98	7.188589	0.756	0.7712158	-0.6625066

BMD Computation

BMD = 0.1068: BMDL = 0.08869

Potency Measures

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

Potency: 0.9868
se: 0.1223
var=se^2: 0.01496
Per cent. of background at unit dose: 37
Per cent. of background at the highest dose: 61
ED50 (95% CI): 0.7024 (0.5509 , 0.8956)

ln(Potency) -0.01327
se[log(Potency)]: 0.1239
se[log(Potency)]^2: 0.0153

b. Pup, Repeated

```
                    DISULFOTON:11-D:BRAIN:F:WHOLE
                       Fri Jan 04 19:39:47 1980
              MRID: 46637102RPPU21   Guideline: NONGUIDELINE
                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
25.736836 30.569590 -9.868418

Coefficients:
     Value Std.Error
A 9.700061 0.1054270
m 2.349013 0.0773280

Correlation:
          A         m
A 1.0000000 0.7582823
m 0.7582823 1.0000000

Approximate 95% confidence intervals

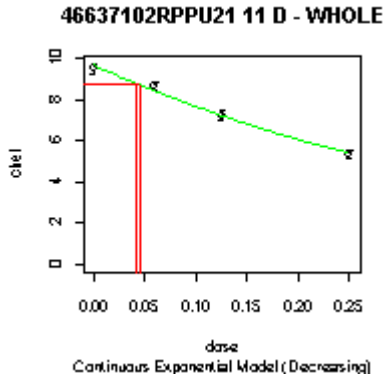
 Coefficients:
     lower     est.    upper
A 9.488376 9.700061 9.916468
m 2.197160 2.349013 2.511362

 Residual standard error:
    lower      est.     upper
0.3317666 0.4090422 0.5335702

Degrees of freedom: 37 total; 35 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 5.789 with 2 degrees of freedom.  P =
0.0553

   dose  n chei Expected    sd    Exp.SD  X2 Resid.
1 0.000  9 9.50 9.700061 0.372 0.4158100 -1.4434042
2 0.060 10 8.64 8.424898 0.236 0.3622483  1.8777542
3 0.125  9 7.22 7.231926 0.326 0.3119803 -0.1146848
```



```
4 0.250  9 5.36 5.391797 0.265 0.2340773 -0.4075226

    ------------------------------------------------------------------
                              BMD Computation

                      BMD = 0.04485:  BMDL = 0.04255

    ------------------------------------------------------------------
                              Potency Measures

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

Potency: 2.349
se: 0.07733
var=se^2: 0.00598
Per cent. of background at unit dose: 9.5
Per cent. of background at the highest dose: 56
ED50 (95% CI): 0.2951 ( 0.2766 , 0.3147 )

ln(Potency) 0.854
se[log(Potency)]: 0.03292
se[log(Potency)]^2: 0.001084
```

DISULFOTON:11-D:BRAIN:M:WHOLE
Fri Jan 04 19:39:55 1980
MRID: 46637102RPPU21 Guideline: NONGUIDELINE
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
 41.66038  46.65107 -17.83019

Coefficients:
     Value  Std.Error
A 9.690200 0.12045826
m 2.192024 0.08981002

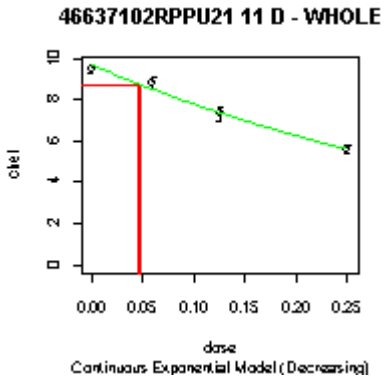
Correlation:
          A         m
A 1.0000000 0.7540415
m 0.7540415 1.0000000

Approximate 95% confidence intervals

 Coefficients:
     lower     est.    upper
A 9.449177 9.690200 9.937372
m 2.017400 2.192024 2.381763

 Residual standard error:
    lower      est.     upper
0.3933414 0.4824713 0.6241960

Degrees of freedom: 39 total; 37 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 7.761 with 2 degrees of freedom. P = 0.0206

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.000	10	9.47	9.690200	0.335	0.4917414	-1.4160588
2	0.060	10	8.81	8.495985	0.405	0.4323255	2.2968893
3	0.125	10	7.29	7.367748	0.455	0.3760317	-0.6538292
4	0.250	9	5.58	5.601918	0.203	0.2875492	-0.2286722

BMD Computation

BMD = 0.04807: BMDL = 0.04503

Potency Measures

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

Potency: 2.192
se: 0.08981
var=se^2: 0.008066
Per cent. of background at unit dose: 11
Per cent. of background at the highest dose: 58
ED50 (95% CI): 0.3162 (0.2918 , 0.3427)

ln(Potency) 0.7848
se[log(Potency)]: 0.04097
se[log(Potency)]^2: 0.001679

8. Fosthiazate

a. Adult, Repeated

```
                  Fosthiazate:11-D:BRAIN:F:WHOLE
                      Fri Jan 04 17:04:03 1980
            MRID: 00000001SCAD42   Guideline: NONGUIDELINE
              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
 771.0335  776.0242 -382.5167

Coefficients:
         Value    Std.Error
A 5.231487e+04 1.146822e+03
m 1.764253e-01 8.763907e-03

Correlation:
          A         m
A 1.0000000 0.5728014
m 0.5728014 1.0000000

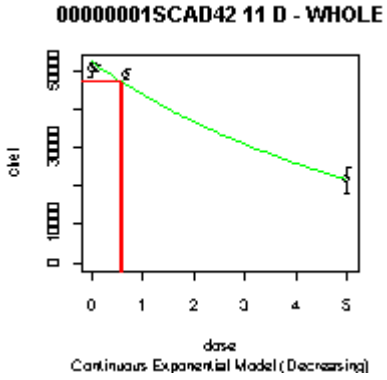
Approximate 95% confidence intervals

 Coefficients:
         lower         est.        upper
A 5.004204e+04 5.231487e+04 5.469093e+04
m 1.595323e-01 1.764253e-01 1.951070e-01

 Residual standard error:
   lower     est.    upper
4622.142 5669.505 7334.907

Degrees of freedom: 39 total; 37 residual
    ------------------------------------------------------------------
                            Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 3.973 with 2 degrees of freedom.  P =
0.137
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	9	50227	52314.87	2570.2	5816.164	-1.0769337
2	0.1	10	50726	51400.00	1031.3	5718.097	-0.3727430
3	0.7	10	48882	46237.12	1780.8	5163.463	1.6198102
4	5.0	10	21476	21653.22	4545.2	2485.323	-0.2254954

BMD Computation

BMD = 0.5972: BMDL = 0.5521

Potency Measures

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

Potency: 0.1764
se: 0.008764
var=se^2: 7.681e-05
Per cent. of background at unit dose: 84
Per cent. of background at the highest dose: 41
ED50 (95% CI): 3.929 (3.564 , 4.331)

ln(Potency) -1.735
se[log(Potency)]: 0.04967
se[log(Potency)]^2: 0.002468

Fosthiazate:11-D:BRAIN:M:WHOLE
Fri Jan 04 17:04:12 1980
MRID: 00000001SCAD42 Guideline: NONGUIDELINE
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
 756.4962  761.5628 -375.2481

Coefficients:
         Value    Std.Error
A 5.069850e+04 6.164745e+02
m 5.587328e-02 4.823793e-03

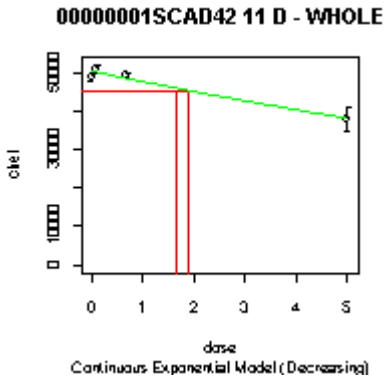
Correlation:
          A         m
A 1.0000000 0.5736298
m 0.5736298 1.0000000

Approximate 95% confidence intervals

 Coefficients:
         lower         est.        upper
A 4.946575e+04 5.069850e+04 5.196197e+04
m 4.691377e-02 5.587328e-02 6.654387e-02

 Residual standard error:
   lower     est.    upper
2635.439 3224.781 4156.027

Degrees of freedom: 40 total; 38 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 3.652 with 2 degrees of freedom. P = 0.161

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	49176	50698.50	1372.3	3191.493	-1.5085630
2	0.1	10	51198	50416.02	1783.8	3173.860	0.7791255
3	0.7	10	49595	48753.89	907.2	3070.090	0.8663646
4	5.0	10	38237	38341.39	4346.9	2419.294	-0.1364445

BMD Computation

BMD = 1.886: BMDL = 1.651

Potency Measures

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

Potency: 0.05587
se: 0.004824
var=se^2: 2.327e-05
Per cent. of background at unit dose: 95
Per cent. of background at the highest dose: 76
ED50 (95% CI): 12.41 (10.47 , 14.69)

ln(Potency) -2.885
se[log(Potency)]: 0.08633
se[log(Potency)]^2: 0.007454

b. Pup, Repeated

```
                    Fosthiazate:11-D:BRAIN:F:WHOLE
                        Fri Jan 04 17:04:21 1980
                MRID: 00000001SCPU21   Guideline: NONGUIDELINE
                  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
 794.2296  799.2963 -394.1148

Coefficients:
         Value    Std.Error
A 3.974383e+04 1.250093e+03
m 2.210278e-01 1.263111e-02

Correlation:
          A         m
A 1.0000000 0.5687707
m 0.5687707 1.0000000

Approximate 95% confidence intervals

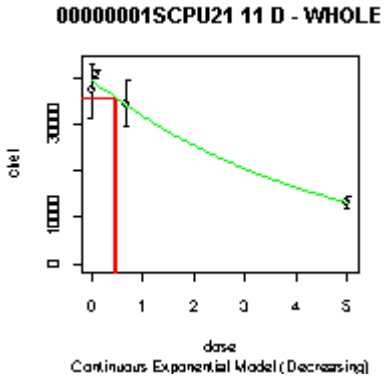
 Coefficients:
         lower         est.        upper
A 3.729203e+04 3.974383e+04 4.235682e+04
m 1.968811e-01 2.210278e-01 2.481359e-01

 Residual standard error:
   lower     est.    upper
5457.450 6677.856 8606.275

Degrees of freedom: 40 total; 38 residual
    ------------------------------------------------------------------
                               Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 2.562 with 2 degrees of freedom.  P =
0.278

  dose  n  chei Expected     sd   Exp.SD   X2 Resid.
1  0.0 10 37284 39743.83 8312.6 6465.951 -1.20301754
2  0.1 10 40936 38875.01 1081.5 6327.118  1.03007554
3  0.7 10 34444 34046.77 6956.5 5554.526  0.22615114
```



```
4  5.0 10 13125 13161.76 1810.5 2184.277 -0.05321862

    ------------------------------------------------------------------
                              BMD Computation

                      BMD = 0.4767:  BMDL = 0.4357

    ------------------------------------------------------------------
                              Potency Measures

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

Potency: 0.221
se: 0.01263
var=se^2: 0.0001595
Per cent. of background at unit dose: 80
Per cent. of background at the highest dose: 33
ED50 (95% CI): 3.136 ( 2.804 , 3.508 )

ln(Potency) -1.509
se[log(Potency)]: 0.05715
se[log(Potency)]^2: 0.003266
```

Fosthiazate:11-D:BRAIN:M:WHOLE
Fri Jan 04 17:04:28 1980
MRID: 00000001SCPU21 Guideline: NONGUIDELINE
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
 849.4277  854.4943 -421.7138

Coefficients:
         Value    Std.Error
A 4.039893e+04 2.229497e+03
m 1.428993e-01 2.204119e-02

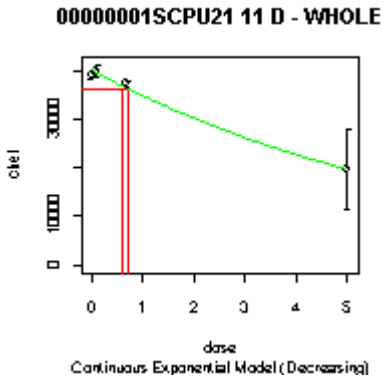
Correlation:
          A         m
A 1.0000000 0.5709342
m 0.5709342 1.0000000

Approximate 95% confidence intervals

 Coefficients:
         lower         est.        upper
A 3.612853e+04 4.039893e+04 4.517408e+04
m 1.045737e-01 1.428993e-01 1.952711e-01

 Residual standard error:
    lower      est.     upper
 9377.115 11474.044 14787.498

Degrees of freedom: 40 total; 38 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.2129 with 2 degrees of freedom. P = 0.899

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.0	10	39177	40398.93	1109.0	11536.40	-0.33494641
2	0.1	10	40093	39825.74	2031.0	11375.46	0.07429724
3	0.7	10	37563	36553.38	825.1	10455.89	0.30534876
4	5.0	10	19692	19772.79	11643.7	5714.83	-0.04470237

```
-------------------------------------------------------------------
                          BMD Computation

                  BMD = 0.7373:  BMDL = 0.5881

-------------------------------------------------------------------
                          Potency Measures

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

Potency: 0.1429
se: 0.02204
var=se^2: 0.0004858
Per cent. of background at unit dose: 87
Per cent. of background at the highest dose: 49
ED50 (95% CI): 4.851 ( 3.585 , 6.563 )

ln(Potency) -1.946
se[log(Potency)]: 0.1542
se[log(Potency)]^2: 0.02379
```

9. Methamidophos

a. Adult, Repeated

```
                Methamidophos:11-D:BRAIN:F:WHOLE
                     Sun Feb 17 20:36:39 2002
           MRID: 46859801Ad   Guideline: NONGUIDELINE
           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
    ------------------------------------------------------------------
                    Summary of Model Fitting Results

      AIC       BIC    logLik
 56.17302  58.84414 -25.08651

Coefficients:
      Value Std.Error
A 9.8844932 0.4189034
m 0.5824907 0.2197488

Correlation:
          A         m
A 1.0000000 0.7724789
m 0.7724789 1.0000000

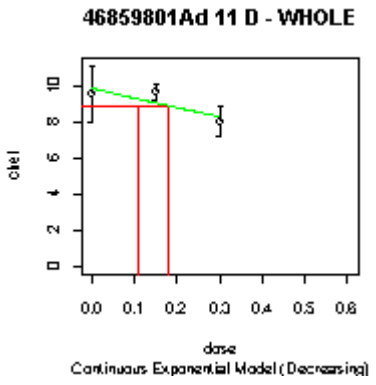
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 9.0351806 9.8844932 10.813642
m 0.2617955 0.5824907  1.296032

 Residual standard error:
    lower      est.     upper
0.8195475 1.1004037 1.6747363

Degrees of freedom: 18 total; 16 residual
    ------------------------------------------------------------------
                             Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 2.855 with 1 degrees of freedom.  P =
0.0911
```



```
  dose n chei Expected    sd    Exp.SD  X2 Resid.
1 0.00 6 9.57 9.884493 1.512 1.1228915 -0.6860395
2 0.15 6 9.64 9.057504 0.442 1.0342205  1.3796071
3 0.30 6 8.03 8.299705 0.758 0.9525516 -0.6935475

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 0.1809:  BMDL = 0.1116

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 0.5825
se: 0.2197
var=se^2: 0.04829
Per cent. of background at unit dose: 56
Per cent. of background at the highest dose: 84
ED50 (95% CI): 1.19 ( 0.5681 , 2.493 )

ln(Potency) -0.5404
se[log(Potency)]: 0.3773
se[log(Potency)]^2: 0.1423
```

Methamidophos:11-D:BRAIN:M:WHOLE
Sun Feb 17 20:37:16 2002
MRID: 46859801Ad Guideline: NONGUIDELINE
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

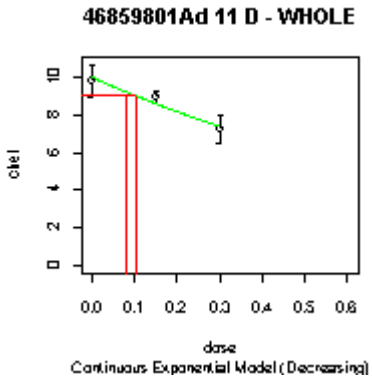
---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
 41.26049  43.93160 -17.63024

Coefficients:
      Value Std.Error
A 10.039986 0.2952989
m  1.019360 0.1526541

Correlation:
          A         m
A 1.0000000 0.7719894
m 0.7719894 1.0000000
```




```
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 9.4330967 10.039986 10.685919
m 0.7420852  1.019360  1.400236

 Residual standard error:
    lower      est.     upper
0.5802877 0.7791504 1.1858116

Degrees of freedom: 18 total; 16 residual
```

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 2.533 with 1 degrees of freedom. P = 0.112

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	6	9.83	10.039986	0.854	0.7913788	-0.6499513
2	0.15	6	8.98	8.616437	0.307	0.6834587	1.3029945
3	0.30	6	7.24	7.394731	0.680	0.5902557	-0.6421149

BMD Computation

BMD = 0.1034: BMDL = 0.08293

Potency Measures

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

Potency: 1.019
se: 0.1527
var=se^2: 0.0233
Per cent. of background at unit dose: 36
Per cent. of background at the highest dose: 74
ED50 (95% CI): 0.68 (0.507 , 0.912)

ln(Potency) 0.01917
se[log(Potency)]: 0.1498
se[log(Potency)]^2: 0.02243

b. Pup, Repeated

```
                    Methamidophos:11-D:BRAIN:F:WHOLE
                         Sun Feb 17 20:33:19 2002
                  MRID: 46656401Pup   Guideline: NONGUIDELINE
                   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
 41.41324  46.47987 -17.70662

Coefficients:
     Value  Std.Error
A 8.987019 0.10454000
m 1.158569 0.06860376

Correlation:
          A         m
A 1.0000000 0.7372098
m 0.7372098 1.0000000

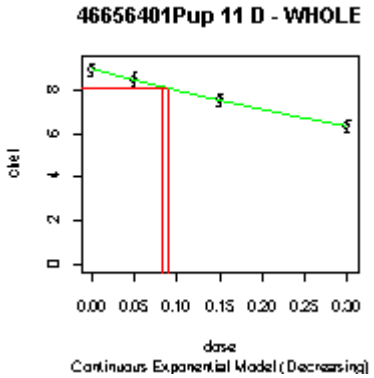
Approximate 95% confidence intervals

 Coefficients:
     lower     est.    upper
A 8.777861 8.987019 9.201161
m 1.027689 1.158569 1.306117

 Residual standard error:
    lower      est.     upper
0.3643953 0.4458821 0.5746431

Degrees of freedom: 40 total; 38 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.07411 with 2 degrees of freedom.  P =
0.964
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	10	8.97	8.987019	0.407	0.4467280	-0.12047342
2	0.05	10	8.51	8.481207	0.415	0.4215851	0.21597626
3	0.15	10	7.54	7.553385	0.349	0.3754648	-0.11273291
4	0.30	10	6.35	6.348448	0.393	0.3155696	0.01554928

BMD Computation

BMD = 0.09094: BMDL = 0.08287

Potency Measures

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

Potency: 1.159
se: 0.0686
var=se^2: 0.004706
Per cent. of background at unit dose: 31
Per cent. of background at the highest dose: 71
ED50 (95% CI): 0.5983 (0.5327 , 0.6719)

ln(Potency) 0.1472
se[log(Potency)]: 0.05921
se[log(Potency)]^2: 0.003506

Methamidophos:11-D:BRAIN:M:WHOLE
Sun Feb 17 20:33:49 2002
MRID: 46656401Pup Guideline: NONGUIDELINE
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
 39.39394  46.14946 -15.69697

Coefficients:
     Value Std.Error
A 9.024311 0.1247331
B 4.263469 1.5687256
m 2.759075 1.3908508

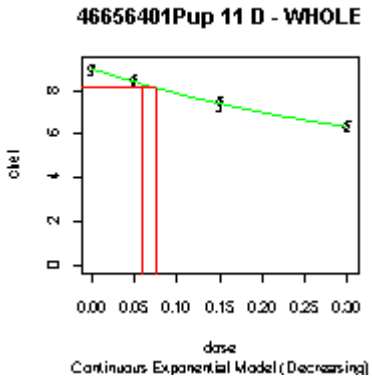
Correlation:
          A         B         m
A 1.0000000 0.5038750 0.5700879
B 0.5038750 1.0000000 0.9925059
m 0.5700879 0.9925059 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower     est.    upper
A 8.7750842 9.024311 9.280617
B 2.0229445 4.263469 8.985500
m 0.9935122 2.759075 7.662206

 Residual standard error:
    lower      est.     upper
0.3532281 0.4332684 0.5605399

Degrees of freedom: 40 total; 37 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.3533 with 1 degrees of freedom. P = 0.552

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	10	8.99	9.024311	0.328	0.4346546	-0.24962762
2	0.05	10	8.47	8.410824	0.315	0.4054724	0.46151099
3	0.15	10	7.38	7.410827	0.479	0.3574913	-0.27268752
4	0.30	10	6.35	6.344164	0.321	0.3055677	0.06039276

BMD Computation

BMD = 0.07617: BMDL = 0.06053

Potency Measures

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

Potency: 2.759
se: 1.391
var=se^2: 1.934
Per cent. of background at unit dose: 6.3
Per cent. of background at the highest dose: 44
ED50 (95% CI): 0.2512 (0.09353 , 0.6748)

ln(Potency) 1.015
se[log(Potency)]: 0.5041
se[log(Potency)]^2: 0.2541

10. Methyl Parathion

a. Adult, Repeated

```
                METHYL PARATHION:11-D:BRAIN:F:WHOLE
                      Fri Jan 04 14:23:40 1980
            MRID: 45646501RDADPhase3   Guideline: NONGUIDELINE
                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
170.68648 177.16313 -82.34324

Coefficients:
       Value  Std.Error
A 15.9491003 0.15998987
m  0.1601876 0.02990362

Correlation:
          A         m
A 1.0000000 0.6920998
m 0.6920998 1.0000000

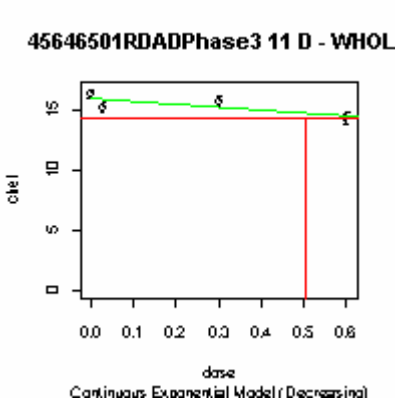
Approximate 95% confidence intervals

 Coefficients:
       lower       est.      upper
A 15.6324703 15.9491003 16.2721435
m  0.1102974  0.1601876  0.2326444

 Residual standard error:
    lower      est.     upper
0.8052404 0.9464613 1.1482162

Degrees of freedom: 64 total; 62 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 17.06 with 2 degrees of freedom.  P =
0.000197
```



	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	16	16.34	15.94910	0.684	0.9232395	1.6936005
2	0.03	16	15.20	15.87264	0.746	0.9188915	-2.9280442
3	0.30	16	15.68	15.20077	0.671	0.8806700	2.1766570
4	0.60	16	14.29	14.48755	0.923	0.8400633	-0.9406575

BMD Computation

BMD = 0.6577: BMDL = 0.5032

Potency Measures

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

Potency: 0.1602
se: 0.0299
var=se^2: 0.0008942
Per cent. of background at unit dose: 85
Per cent. of background at the highest dose: 91
ED50 (95% CI): 4.327 (3.001 , 6.239)

ln(Potency) -1.831
se[log(Potency)]: 0.1867
se[log(Potency)]^2: 0.03485

b. Pup, Repeated

```
                METHYL PARATHION:11-D:BRAIN:F:WHOLE
                      Fri Jan 04 14:23:59 1980
          MRID: 45646501RDPUPhase1   Guideline: NONGUIDELINE
              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
    ------------------------------------------------------------------
                    Summary of Model Fitting Results

      AIC       BIC    logLik
105.54891 111.16251 -49.77445

Coefficients:
       Value  Std.Error
A 10.6610185 0.14489339
m  0.9980264 0.07809508

Correlation:
          A         m
A 1.0000000 0.6318274
m 0.6318274 1.0000000

Approximate 95% confidence intervals

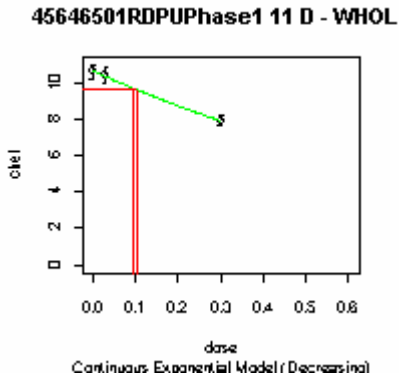
 Coefficients:
      lower       est.    upper
A 10.373317 10.6610185 10.95670
m  0.852584  0.9980264  1.16828

 Residual standard error:
    lower      est.     upper
0.6446817 0.7758137 0.9744110

Degrees of freedom: 48 total; 46 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.05715 with 1 degrees of freedom.  P =
0.811


  dose  n  chei  Expected    sd    Exp.SD   X2 Resid.
```



```
1 0.00 16 10.63 10.661018 0.728 0.7779939 -0.15947931
2 0.03 16 10.38 10.346550 0.857 0.7550719  0.17719987
3 0.30 16  7.90  7.902554 0.547 0.5768957 -0.01771025

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 0.1056:  BMDL = 0.09353

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 0.998
se: 0.0781
var=se^2: 0.006099
Per cent. of background at unit dose: 37
Per cent. of background at the highest dose: 74
ED50 (95% CI): 0.6945 ( 0.5958 , 0.8096 )

ln(Potency) -0.001976
se[log(Potency)]: 0.07825
se[log(Potency)]^2: 0.006123
```

METHYL PARATHION:11-D:BRAIN:M:WHOLE
Fri Jan 04 14:24:09 1980
MRID: 45646501RDPUPhase1 Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

```
      AIC       BIC    logLik
151.25461 156.86822 -72.62731

Coefficients:
      Value Std.Error
A 10.809039 0.2388483
m  1.225511 0.1272956

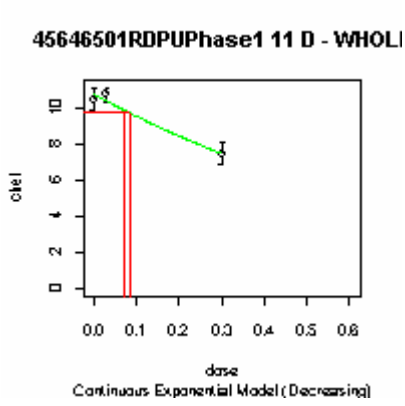
Correlation:
          A         m
A 1.0000000 0.6305977
m 0.6305977 1.0000000

Approximate 95% confidence intervals

 Coefficients:
       lower      est.     upper
A 10.3387980 10.809039 11.300668
m  0.9942922  1.225511  1.510500

 Residual standard error:
   lower     est.    upper
1.061047 1.276870 1.603730

Degrees of freedom: 48 total; 46 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 2.088 with 1 degrees of freedom. P = 0.148

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	16	10.50	10.809039	1.064	1.2822245	-0.9640720
2	0.03	16	10.75	10.418858	0.803	1.2364853	1.0712374
3	0.30	16	7.46	7.483715	1.202	0.8916881	-0.1063828

BMD Computation

BMD = 0.08597: BMDL = 0.07343

Potency Measures

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

Potency: 1.226
se: 0.1273
var=se^2: 0.0162
Per cent. of background at unit dose: 29
Per cent. of background at the highest dose: 69
ED50 (95% CI): 0.5656 (0.4614 , 0.6933)

ln(Potency) 0.2034
se[log(Potency)]: 0.1039
se[log(Potency)]^2: 0.01079

11. Phorate

a. Pup, Repeated

```
                    Phorate:11-D:BRAIN:F:WHOLE
                      Fri Jan 04 20:39:04 1980
                MRID: 46214401   Guideline: NONGUIDELINE
               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
15.737128 19.940720 -4.868564

Coefficients:
         Value  Std.Error
A 1.400000e+00 0.07737654
m 2.624270e-05 0.91691413

Correlation:
          A         m
A 1.0000000 0.7189016
m 0.7189016 1.0000000

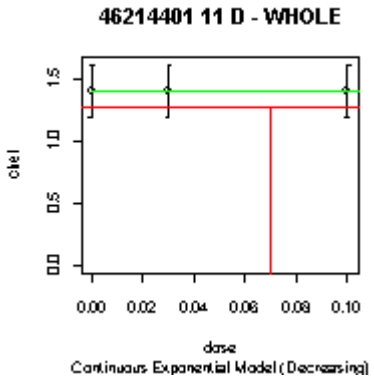
Approximate 95% confidence intervals

 Coefficients:
     lower         est.    upper
A 1.250144 1.400000e+00 1.567819
m 0.000000 2.624270e-05      Inf

 Residual standard error:
    lower      est.     upper
0.2337841 0.2945945 0.3984248

Degrees of freedom: 30 total; 28 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 1.695e-09 with 1 degrees of freedom.  P
= 1
```



```
  dose  n chei Expected  sd    Exp.SD    X2 Resid.
1 0.00 10  1.4 1.400000 0.3 0.2945945 3.557377e-11
2 0.03 10  1.4 1.399999 0.3 0.2945943 1.183136e-05
3 0.10 10  1.4 1.399996 0.3 0.2945937 3.943781e-05

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 4015:  BMDL = 0.06986

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 2.624e-05
se: 0.9169
var=se^2: 0.8407
Per cent. of background at unit dose: 100
Per cent. of background at the highest dose: 100
ED50 (95% CI): 26410 ( 0 , Inf )

ln(Potency) -10.55
se[log(Potency)]: 34940
se[log(Potency)]^2: 1.221e+09
```

Phorate:11-D:BRAIN:M:WHOLE
Fri Jan 04 20:39:14 1980
MRID: 46214401 Guideline: NONGUIDELINE
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
-15.42306	-11.21946	10.71153

Coefficients:

	Value	Std.Error
A	1.398910	0.05109735
m	2.407170	0.60590437

Correlation:

	A	m
A	1.0000000	0.7189526
m	0.7189526	1.0000000

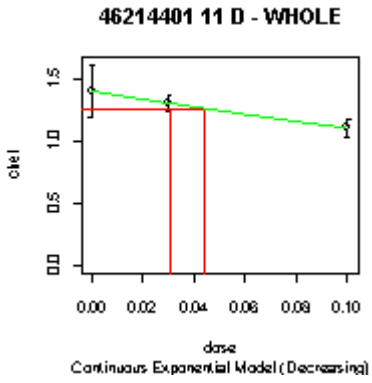
Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	1.298061	1.398910	1.507593
m	1.437422	2.407170	4.031154

Residual standard error:

lower	est.	upper
0.1544947	0.1946809	0.2632965



Degrees of freedom: 30 total; 28 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.001013 with 1 degrees of freedom. P = 0.975

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	10	1.4	1.398910	0.3	0.1945472	0.017720948
2	0.03	10	1.3	1.301449	0.1	0.1809805	-0.025315000
3	0.10	10	1.1	1.099633	0.1	0.1528906	0.007597111

BMD Computation

BMD = 0.04377: BMDL = 0.03095

Potency Measures

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

Potency: 2.407
se: 0.6059
var=se^2: 0.3671
Per cent. of background at unit dose: 9
Per cent. of background at the highest dose: 79
ED50 (95% CI): 0.288 (0.1758 , 0.4716)

ln(Potency) 0.8785
se[log(Potency)]: 0.2517
se[log(Potency)]^2: 0.06336

12. Terbufos

a. Adult, Repeated

```
                    Terbufos:11-D:BRAIN:F:WHOLE
                      Fri Jan 04 18:16:53 1980
              MRID: 46247601SCAD70   Guideline: NONGUIDELINE
                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
143.64430 152.27983 -67.82215

Coefficients:
      Value  Std.Error
A  2.579956  0.1889585
B  1.271775  0.3970392
m 14.425263 12.2358396

Correlation:
          A         B         m
A 1.0000000 0.3010440 0.4260414
B 0.3010440 1.0000000 0.9450704
m 0.4260414 0.9450704 1.0000000

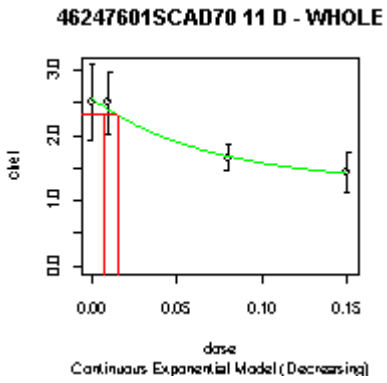
Approximate 95% confidence intervals

 Coefficients:
      lower      est.     upper
A 2.2284758  2.579956  2.986872
B 0.6812303  1.271775  2.374251
m 2.6454847 14.425263 78.657875

 Residual standard error:
    lower      est.     upper
0.7738684 0.9106888 1.1067344

Degrees of freedom: 64 total; 61 residual
    ------------------------------------------------------------------
                            Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 0.3361 with 1 degrees of freedom.  P =
```



0.562

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	16	2.50	2.579956	1.10	0.9357818	-0.34177108
2	0.01	16	2.50	2.404227	0.91	0.8769715	0.43683705
3	0.08	16	1.66	1.684331	0.37	0.6202664	-0.15690602
4	0.15	16	1.43	1.422070	0.57	0.5139694	0.06171211

BMD Computation

BMD = 0.01523: BMDL = 0.007784

Potency Measures

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

Potency: 14.43
se: 12.24
var=se^2: 149.7
Per cent. of background at unit dose: 5.4e-05
Per cent. of background at the highest dose: 11
ED50 (95% CI): 0.04805 (0.009113 , 0.2534)

ln(Potency) 2.669
se[log(Potency)]: 0.8482
se[log(Potency)]^2: 0.7195

Terbufos:11-D:BRAIN:M:WHOLE
Fri Jan 04 18:17:02 1980
MRID: 46247601SCAD70 Guideline: NONGUIDELINE
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
 209.3039  215.7805 -101.6519

Coefficients:
     Value Std.Error
A 3.144962  0.227199
m 1.075126  0.842295

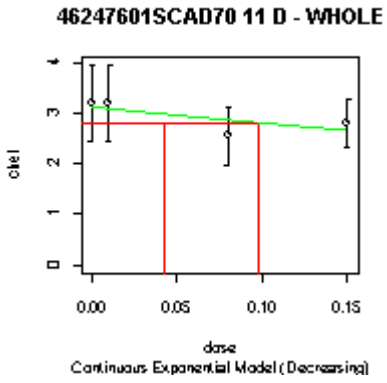
Correlation:
          A         m
A 1.0000000 0.7079674
m 0.7079674 1.0000000

Approximate 95% confidence intervals

 Coefficients:
      lower     est.    upper
A 2.7220671 3.144962 3.633556
m 0.2245551 1.075126 5.147489

 Residual standard error:
   lower     est.    upper
1.118651 1.314837 1.595117

Degrees of freedom: 64 total; 62 residual
```



Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 1.7 with 2 degrees of freedom. P = 0.428

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	16	3.22	3.144962	1.46	1.291322	0.2324390
2	0.01	16	3.21	3.111330	1.42	1.276255	0.3092472
3	0.08	16	2.56	2.885770	1.06	1.175595	-1.1084417
4	0.15	16	2.83	2.676561	0.90	1.082874	0.5667836

BMD Computation

BMD = 0.098: BMDL = 0.04282

Potency Measures

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

Potency: 1.075
se: 0.8423
var=se^2: 0.7095
Per cent. of background at unit dose: 34
Per cent. of background at the highest dose: 85
ED50 (95% CI): 0.6447 (0.1388 , 2.994)

ln(Potency) 0.07244
se[log(Potency)]: 0.7834
se[log(Potency)]^2: 0.6138

b. Pup, Repeated

```
                    Terbufos:11-D:BRAIN:F:WHOLE
                       Fri Jan 04 18:15:43 1980
              MRID: 46214301SCPU21   Guideline: NONGUIDELINE
                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
    ------------------------------------------------------------------
                    Summary of Model Fitting Results

      AIC       BIC    logLik
 31.15934  35.36293 -12.57967

Coefficients:
     Value Std.Error
A 2.427871 0.1103401
m 6.606930 0.9860690

Correlation:
          A         m
A 1.0000000 0.6399046
m 0.6399046 1.0000000

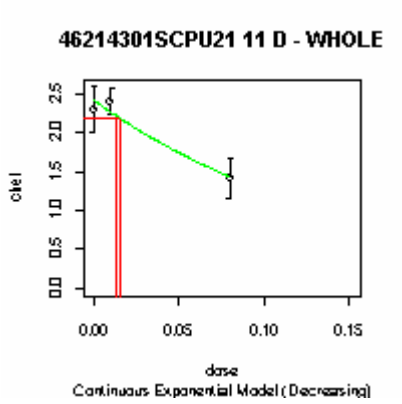
Approximate 95% confidence intervals

 Coefficients:
     lower     est.    upper
A 2.212051 2.427871 2.664747
m 4.866617 6.606930 8.969583

 Residual standard error:
    lower      est.     upper
0.3652663 0.4602769 0.6225023

Degrees of freedom: 30 total; 28 residual
    ------------------------------------------------------------------
                              Goodness of Fit
 The chi-squared goodness-of-fit values should be taken as general
indications of fit only.  P-values are likely to be inaccurate to some
degree

Pearson Chi-Square Statistic: 1.79 with 1 degrees of freedom.  P =
0.181
```



```
  dose  n chei Expected   sd    Exp.SD  X2 Resid.
1 0.00 10 2.30 2.427871 0.41 0.4616504 -0.8759065
2 0.01 10 2.41 2.272647 0.25 0.4330055  1.0030998
3 0.08 10 1.42 1.431124 0.37 0.2765380 -0.1272065

    ------------------------------------------------------------------
                            BMD Computation

                      BMD = 0.01595:  BMDL = 0.0128

    ------------------------------------------------------------------
                            Potency Measures

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

Potency: 6.607
se: 0.9861
var=se^2: 0.9723
Per cent. of background at unit dose: 0.14
Per cent. of background at the highest dose: 59
ED50 (95% CI): 0.1049 ( 0.0783 , 0.1406 )

ln(Potency) 1.888
se[log(Potency)]: 0.1492
se[log(Potency)]^2: 0.02227
```

Terbufos:11-D:BRAIN:M:WHOLE
Fri Jan 04 18:15:54 1980
MRID: 46214301SCPU21 Guideline: NONGUIDELINE
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

---

Summary of Model Fitting Results

AIC	BIC	logLik
22.48412	26.68771	-8.24206

Coefficients:

	Value	Std.Error
A	2.367231	0.09659283
m	6.892402	0.88022711

Correlation:

	A	m
A	1.0000000	0.6425834
m	0.6425834	1.0000000

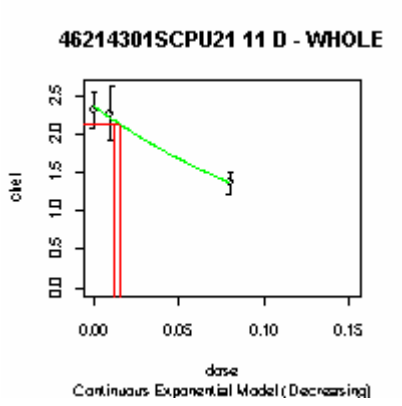
Approximate 95% confidence intervals

Coefficients:

	lower	est.	upper
A	2.177413	2.367231	2.573597
m	5.305893	6.892402	8.953292

Residual standard error:

lower	est.	upper
0.3150565	0.3970068	0.5369326



Degrees of freedom: 30 total; 28 residual

Goodness of Fit

The chi-squared goodness-of-fit values should be taken as general indications of fit only. P-values are likely to be inaccurate to some degree

Pearson Chi-Square Statistic: 0.3174 with 1 degrees of freedom. P = 0.573

	dose	n	chei	Expected	sd	Exp.SD	X2 Resid.
1	0.00	10	2.32	2.367231	0.33	0.4043590	-0.36937097
2	0.01	10	2.26	2.209568	0.49	0.3777446	0.42219003
3	0.08	10	1.36	1.363874	0.20	0.2345395	-0.05222699

BMD Computation

BMD = 0.01529: BMDL = 0.01263

Potency Measures

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

Potency: 6.892
se: 0.8802
var=se^2: 0.7748
Per cent. of background at unit dose: 0.1
Per cent. of background at the highest dose: 58
ED50 (95% CI): 0.1006 (0.0783 , 0.1292)

ln(Potency) 1.93
se[log(Potency)]: 0.1277
se[log (Potency)]^2 : 0.01631

B-2. RBC and brain ChE activity in dams and fetuses from comparative ChE studies following gestational exposure

The following table (Table II.B.2 1) provides summary of RBC and brain ChE data from gestational exposure studies to dams and fetuses of selected OPs. The OPs included are the same as those selected for refined FQPA analysis (See I.B). DDVP is not included here as the laboratory reported unusually low control values which makes interpretation of the data problematic. EPA has asked that the dichlorovos comparative ChE study be repeated by the registrant.

For chemicals where only 'fetuses' are provided, the study reported data derived from samples where the male and female fetuses were pooled. The means and standard deviation are provided except for chlorpyrifos. The values provided in parentheses are calculated percent inhibition values. In the chlorpyrifos study, activity was reported as percent of control or as measured absorbance. For chlorpyrifos, the percent activity of control is listed.

Table II.B-2. 1 RBC and brain ChE activity in dams and fetuses from comparative ChE studies following gestational exposure.

OP	Cholinesterase & Group	Dose (mg/kg/day)				
	Dose	**0**	**0.5**	**1**	**2.5**	**10**
Acephate **MRID 46151805**	GD 21 Dams RBC Brain	1.6360 ± 0.7461 8.6009 ± 1.4779	1.9691 ± 0.7684 7.1673 ± 0.8621 (17)	2.3221 ± 0.5884 7.0441 ± 0.900 (18)	1.4638 ± 0.7615 5.096 ± 0.933 (41)	1.5202 ± 0.6202 3.3112 ± 0.5209 (62)
	GD 21 Fetuses RBC Brain	1.7284± 0.5776 1.4688 ± 0.0871	1.9883 ± 0.7651 1.3613 ± 0.1320	1.4476 ± 0.2403 1.2915 ± 0.1313 (12)	1.0662 ± 0.3121 1.2586 ± 0.1666 (14)	1.3385± 0.5334 0.8816 ± 0.1254 (40)
	Dose	**0**	**0.2**	**0.9**	**1.2**	
Azinphos methyl **MRID 46291101**	GD 20 Dams RBC Brain	1.43 ± 0.31 11.1 ± 0.5	1.41 ± 0.30 (1) 10.8 ± 0.7 (3)	1.39 ± 0.43 (3) 10.0 ± 1.9 (10)	1.05 ± 0.20 (27) 10.7± 0.7 (4)	
	GD 20 Fetuses RBC Brain	1.36 ± 0.28 2.2 ± 0.1	1.30 ± 0.07 (4) 2.3 ± 0.1	1.31 ± 0.15 (4) 2.3 ± 0.2	1.32 ± 0.17 (3) 2.2 ± 0.1 (0)	

OP	Cholinesterase & Group	Dose (mg/kg/day)			
Chlorpyrifos **MRID 44648102** **% activity compared to control**	**Dose**	**0**	**0.3**	**1**	**5**
	GD 20 Dams RBC Hindbrain		73.7**±14.5 101.1±7.2	17.6**±6.7 92.0*±2.2	4.9**±2.8 24.0**±4.8
	GD 20 Fetuses RBC Hindbrain		102.2±20.3 107.0±5.0	106.4±16.7 99.7±5.6	7.9**±4.3 46.1**±9.3
Diazinon **MRID 45842602**	**Dose**	**0**	**0.084**	**0.825**	**26.23**
	GD 20 Dams RBC Brain	1.106± 0.163 17.272± 1.041	1.183 ±0.165 16.925± 1.066	0.719± 0.223 (35) 16.675± 0.617	0.00± 0.00 (100) 3.228 ±0.229 (81.3)
	GD 20 Male fetuses RBC Brain	1.188± 0.230 2.383 ±0.194	1.392 ±0.183 2.380± 0.262	1.319± 0.230 2.194 ±0.161	0.247 ±0.162 (79.2) 1.689± 0.348 (29.1)
	GD 20 Female fetuses RBC Brain	1.208 ±0.143 2.311± 0.198	1.325± 0.172 2.360± 0.395	1.363± 0.254 2.231± 0.234	0.217± 0.148 (82.0) 1.822± 0.372 (21.2)
Dicrotophos **MRID 46153201**	**Dose**	**0**	**0.05**	**0.2**	**1.0**
	GD 20 Dams RBC Brain	2593 ± 218 4.78 ± 0.99	2342 ± 79 (10) 4.26± 1.06 (10)	1638± 120 (37) 2.49± 0.51 (48)	1282 ± 226 (51) 1.03 ± 0.21 (78)
	GD 20 Male fetuses RBC Brain	2546± 112 1.75± 0.34	2423± 351 1.51± 0.25 (14)	1923± 190 (24) 1.22± 0.28 (30)	1311± 124 (49) 0.77± 0.08 (56)

OP	Cholinesterase & Group	Dose (mg/kg/day)			
	GD 20 Female fetuses RBC Brain	 2523 ± 455 1.57± 0.18	 2362± 50 1.36± 0.13 (13)	 1825± 207 (28) 1.22± 0.11 (24)	 1414± 142 (44) 0.72± 0.02 (54)
Dimethoate **MRID 45529702**	**Dose**	**0.0**	**0.1**	**0.5**	**3.0**
	GD 20 Dams RBC Brain	 1669 ± 180 12,838 ± 1373	 1563 ± 224 (6) 13,044 ± 530 (-2)	 1459 ± 278 (13) 11,563 ± 300 (10)	 709 ± 104 (58) 5094 ± 1081 (60)
	GD 20 Fetuses RBC Brain	 1213 ± 79 1781 ± 175	 1225 ± 98 (-1) 1569 ± 173 (12)	 1181 ± 172 (3) 1600 ± 136 (10)	 834 ± 183 (31) 1188 ± 164 (33)
Disulfoton **MRID 46635901**	**Dose**	**0**	**0.042**	**0.168**	**0.694**
	GD 20 Dams RBC Brain	 2.02±0.34 11.97±0.53	 1.66±0.31 (18) 11.35±0.50 (5)	 1.13±0.37 (44) 8.12±0.44 (32)	 0.20±0.13 (90) 1.76±0.19 (85)
	GD 20 Fetuses RBC Brain	 1.27±0.16 1.81±0.30	 1.21±0.20 1.75±0.28	 1.02±0.19 (20) 1.74±0.26	 0.22±0.11 (83) 1.18±0.21 (35)
Fosthiazate **Not yet assigned**	**Dose**	**0**	**0.1**	**0.7**	**5**
	GD 20 Dams RBC Brain	 3931± 1474.5 49446± 2189.8	 3831 ± 757.3 48974 ± 1364.5	 2193 ± 712.2 (44) 47135 ± 1510 (5)	 20 ± 0.0 (99) 5152± 1718.9 (90)
	GD 20 Fetuses RBC Brain	 2644± 644.1 6612 ± 679.5	 3283 ± 992.4 6328 ± 476.3	 2893± 738.3 6251 ± 649.5 (5)	 1851 ± 593.4 (30) 5182 ± 684.5 (22)

OP	Cholinesterase & Group	Dose (mg/kg/day)			
	Dose	**0**	**0.10**	**1.03**	**3.12**
Methamidophos **MRID 46660901**	GD 20 Dams RBC Brain	 1.64 ± 0.286 10.82 ± 0.271	 1.68± 0.220 10.40± 1.711	 0.84± 0.117 (49) 4.86 ± 0.416 (55)	 0.45 ± 0.118 (73) 2.32± 0.173 (79)
	GD 20 Fetuses RBC Brain	 1.29 ± 0.196 1.56 ± 0.157	 1.13 ± 0.147 1.51± 0.089	 0.72 ± 0.133 (44) 1.08 ± 0.125 (31)	 0.38 ± 0.075 (55) 0.77 ± 0.061 (51)
	Dose	**0**	**0.03**	**0.30**	**0.60**
Methyl parathion **MRID 45646501**	GD 20 Dams RBC Brain	 1500.1 ± 255.03 13.48 ± 0.807	 1702.3 ± 386.36 13.58 ± 0.428	 979.5± 283.80 (35) 12.26 ± 0.527 (9)	 632.9± 124.52 (58) 9.35± 1.026 (31)
	GD 20 Male fetuses RBC Brain	 1041.3± 145.79 2.10± 0.116	 1082.2 ± 160.9 2.05± 0.095	 1075.0 ± 135.32 2.04 ± 0.173	 808.9 ± 186.38 (22) 1.97± 0.073
	GD 20 Female fetuses RBC Brain	 1090.4 ± 163.7 2.06 ± 0.152	 1118.0 ± 131.13 2.12 ± 0.14	 1010.2 ± 130.36 2.06 ± 0.174	 894.9± 215.77 (18) 2.02 ± 0.092
	Dose	**0**	**0.03**	**0.1**	**0.2**
Phorate **MRID 46241402**	GD 20 Dams RBC Brain	 35.98 ± 1.12 2.95 ± 0.54	 33.92 ± 3.76 2.88 ± 0.74	 30.99 ± 4.82 (14) 2.94± 0.70	 27.64 ± 5.16 (23) 1.73 ± 0.67 (41)
	GD 20 Male fetuses RBC Brain	 7.05 ± 0.83 0.57 ± 0.01	 5.72 ± 0.51 (19) 0.58 ± 0.04	 5.69 ± 0.66 (19) 0.56± 0.03	 6.42 ± 0.56 0.60 ± 0.03 (6)
	GD 20 Female fetuses RBC Brain	 6.80± 0.99 0.59± 0.04	 5.81± 0.91 0.57 ± 0.04	 5.48± 0.89 0.58± 0.02	 6.28 ± 0.78 0.59 ± 0.02

OP	Cholinesterase & Group	Dose (mg/kg/day)			
	Dose	**0**	**0.03**	**0.1**	**0.3/0.2**
Terbufos **MRID 46240802**	GD 20 Dams RBC Brain	 42.30 ± 5.00 3.00 ± 1.12	 40.68 ± 4.00 3.00± 0.79	 14.42± 4.04 (66) 1.96± 0.68 (35)	 4.46± 1.64 (89) 0.69± 0.19 (77)
	GD 20 Male fetuses RBC Brain	 5.16 ± 1.48 0.59± 0.11	 4.63 ± 1.86 0.53± 0.05	 2.51± 0.86 (51) 0.48± 0.04 (19)	 1.62 ± 0.69 (69) 0.36 ± 0.09 (39)
	GD 20 Female fetuses RBC Brain	 4.32 ± 0.85 0.53 ± 0.04	 4.52 ± 0.99 0.57 ± 0.04	 1.99± 1.09 (54) 0.50± 0.05	 1.76 ± 0.75 (59) 0.36± 0.07 (32)

B-3. Cholinesterase data used in OP CRA to derive RPFs and PoDs

See file: OPChEData_06-02-rev.xls

B-4. Spreadsheet with data from repeated dosing comparative ChE studies (juvenile and adult rats)

See file: Compcherepeated.xls