

Improving Hazard Assessments Through Online Training - The EPA/NCEA Benchmark Dose Software Website



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ABSTRACT

EPA is charged by Congress with developing health benchmarks or standards to protect the public from the potentially harmful effects of chemical exposures. Recently developed benchmark dose methods are integral to the development of the cancer slope factors, reference doses (RfDs) and reference concentrations (RfCs) used along with other scientific information to set these standards. EPA's benchmark dose software (BMDS) was developed as a collaborative effort between scientists from EPA's National Center for Environmental Assessment (NCEA) and EPA's National Health and Environmental Effects Laboratory (NHEERL) to support Agency and other risk assessors in performing benchmark dose, dose-response assessments. Over the past year, EPA has made BMDS easier to use by improving its user interface and modeling capabilities to keep up with the state-of-the-science in this important and growing risk assessment field. At the same time, the customer base for BMDS has expanded to over 2,000 registered users in over 80 countries. Though some of these users are experienced risk assessors familiar with benchmark dose methods, it is recognized that many of them are new to methods and BMDS. While NCEA has sponsored internal and public hands-on training courses in the use of BMDS, it was recognized that more was needed to support the expanding BMDS customer base. A web-based, online training program was developed to better assist this broad, international pool of users. The online training course for BMDS reviews the benchmark dose methodology, consistent with the most recent draft of the BMD technical guidance document (EPA, 2000), and the application of BMDS to the various types of data sets that risk assessors may encounter. Several interactive problems and quizzes are included in the training material and certificates are awarded when a passing grade is achieved. This presentation provides an overview of the training course, including EPA NCEA plans to improve the online training program to keep up with the latest Agency risk assessment methods.

WWW.EPA.GOV/NCEA/BMDS_TRAINING

COURSE OUTLINE

U.S. Environmental Protection Agency
Benchmark Dose Software (BMDS) Tutorial

Full Table of Contents

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- III. BENCHMARK DOSE SOFTWARE (BMDS)
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- IV. APPLICATION OF BMDS
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APPENDICES

- Appendix A: Study Manual for Benchmark Dose Software Version 3.2.1
- Appendix B: Technical Questions Document
- Appendix C: Glossary of Terms

QUIZZES FOR EACH MAJOR TOPIC AREA

Choose the correct answer for each question.

BMD Methodology
 Multiple choice question

1 Clustering of experimental subjects is a design issue that can impact model choice. The most common situation in which clustering occurs is in:

A) Cancer bioassays
 B) Developmental Studies
 C) Acute LD studies

Type your answer, then press "Check". If you need help, you can click on the "Hint" button to get a free letter.

BMD Quiz
 Short answer quiz

1 The three basic ways to improve the fit of a given BMD model are to (1) relax all _____ on model parameters, (2) alter the data set and (3) try alternative initial parameter values.

Complete the crossword, then click on "Check" to check your answer. If you are stuck, you can click on "Hint" to get a free letter. Click on a number in the grid to see the clue or clues for that number.

Crossnumber Puzzle for BMD Problems
 Crossnumber



PLENTY OF EXAMPLES AND PROBLEMS TO SOLVE

EXAMPLE 1

1. Study on Studies Selected

- a. Rational Study (Endpoint): The rationale for study selection and endpoint selection, while important components of any comprehensive write-up of a BMD calculation, are beyond the scope of this quantitative example.
- b. Animal type: hepatocellular adenoma or carcinoma
- c. Test animal: B6C3F1 mouse, female
- d. Mode of exposure: gavage
- e. Study: NTP, 1986
- f. Dose-Response Data

Administration Dose (mg/kg/day)	Human Equivalent Dose (mg/kg/day)	Tumor Incidence
0	0	0.00
50	2.03	0.049
100	5.67	0.160

GLOSSARY, HELPFUL LINKS AND OTHER FEATURES. CERTIFICATE OF ACHIEVEMENT AWARDED FOR "PASSING" SCORE IN EACH TOPIC AREA.

GLOSSARY OF TERMS

A

- Adaptive Benchmark:** The response associated with the BMD that is the highest benchmark value in a series of BMDs.
- Adaptive Risk:** The additional probability of total adverse effect response in the presence of the dose, or the probability of response at a given dose, given the probability of response at a lower dose.
- Adverse Effect:** An undesirable change, functional impairment, or pathological lesion that either singly or in combination adversely affects the performance of the study organism or reduces its capacity to respond to an additional environmental challenge.
- Assessment of Model Fit:** The process of determining the extent to which the model fits the data.
- Assessment of Model Selection:** The process of determining the extent to which the model fits the data.
- Assessment of Model Selection:** The process of determining the extent to which the model fits the data.

B

- Benchmark Concentration (BMD):** The concentration of a substance inhaled that is associated with a specified incidence of the response in the target of 10 to 100% of a health effect, or the concentration associated with a specified response or hazard of a specified level.

Benchmark Dose Software

CONGRATULATIONS
 [YOUR NAME]

You have successfully completed the Benchmark Dose Software On-Line Tutorial section on BMD Methodology.

BENEFITS OF ONLINE TRAINING

- EPA/NCEA offers 2-3 Classroom training courses per year
- Students benefit when they take online training prior to class
- Some BMDS users can not attend classroom courses
- BMDS online training is available globally, all day, every day
- Online training ensures a basic level of knowledge
- Online students can provide EPA with feedback via e-mail
- Online training is easily modified to reflect current EPA guidance

FUTURE PLANS

- Improvements and features for visually impaired
- Streaming video of classroom presentations
- Improved online feedback forms
- Addition of models & methods to keep up with existing guidance

OTHER RESOURCES

- BMD technical guidance (epa.gov/ncea/bnchmrk/bmds_peer.htm)
- BMD help manual (epa.gov/ncea/bnchmrk/pdfhelp1-3.exe)
- BMDS website (epa.gov/ncea/bmds.htm)