

Dangerous Decibels®



Teacher Resource Guide

A K-8 curriculum supplement with hands-on science activities about the anatomy and physiology of hearing, the physics of sound, and health-related behaviors for prevention of noise-induced hearing loss.

Partners:



Affiliates:

Veterans Affairs National Center for Rehabilitative Auditory Research
American Tinnitus Association

Funded by:

National Institute of Health



Department of Health and Human Services • National Institutes of Health

Supported by a Science Education Partnership Award (SEPA) from the National Center for Research Resources

Science Education Partnerships Awards of

The National Center for Research Resources

(NCCR Award # R25 RR15634)

The Northwest Health Foundation

The OHSU Tinnitus Clinic

The Collins Medical Trust

The Harold and Arlene Schnitzer CARE Foundation

Dangerous Decibels®

Teacher Resource Guide

The Oregon Museum of Science and Industry
Portland, Oregon

Chief Editor: Marilyn Johnson, PhD,
OMSI Director of Museum and Teacher Education

Development Team: Jeanne Anderson, *Primary Teacher*
Blair Baldwin, *OMSI Manager of Professional Development*
Teresa Hazel, *Middle School Teacher*
Sue Hagmeier, *Consultant*
Marilyn Johnson, *OMSI Director of Museum/Teacher Education*
Donna Vandiver, *K-8 Science Teacher*
Katie Wood, *OMSI Lead Educator of Life Science*

DVD Cast/Production: Blair Baldwin, *OMSI Manager of Professional Development*
Darius Pierce, *OMSI Videographer*
Marilyn Johnson, *OMSI Director of Museum/Teacher Education*
Gabrielle Martin, *student*
William Martin, PhD
Scott Weinrobe, *OMSI Manager of Educational Technology*
Courtney Yilk, *OMSI Outreach Curriculum Developer*
Robert Taylor, *OHSU Tinnitus patient, musician*

Acknowledgements:

We would like to thank the following people for their contributions to the success of this project:

Content Advisors: Robert Folmer, MD
Steve Hassett, *OMSI Lead Educator of Physics*
William Martin, PhD
Mary Meikle, MD
Gloria Reich, MD

Evaluation: Susan Griest, MPH
Scott Ewing

Design: Kelley Scherr
Tony Tapay
Krista Hofmeister
Amanda Rodriguez

Project Support: Nicole Gibbs
Linda Howarth
Vicki McCardle
Barb Siples
Mat Sinclair
Sharon Sipprell

**Principal and
Co-Principal
Investigators:** Susan Holloway
Andrew Jackman, PhD
Marilyn Johnson, PhD
William Martin, PhD

Table of Contents

	Page
Introduction	4
Why Teach About Noise-Induced Hearing Loss?	5
Behavior-Related Objectives	5
The Science of Dangerous Decibels:	6
Background Information for the Teacher	
Physics of Sound	6
Fun Facts About Sound	8
Anatomy and Physiology of the Ear: The Mechanics of Hearing	9
Causes of Hearing Loss	10
Noise-Induced Hearing Loss	11
How Loud is Too Loud? – Measuring Sound/Decibels	12
Tips for Communicating with Individuals with Hearing Loss	14
Classroom Activities	
How to Use this Resource Guide and the Classroom Activities	15
Supplements to the Teachers Resource Guide: DVD and Poster	16
Integrating with Science Curriculum	17
Adapting to Different Grade Levels	18
Activity 1: Balloon Drum	19
Activity 1: Good Vibrations	30
Activity 2: A Sound Balancing Act	41
Activity 4: Shake It, Break It	56
Activity 5: Shapes of Sound	69
Activity 6: Sound Measures	81
Appendix A: Glossary	88
Appendix B: Diagram of the Ear	92
Appendix C: Decibel Scale of Common Sounds	93
Appendix D: Pictures of Stereocilia	94
Appendix E: “How Loud is Too Loud?”	96
At-Home Activity Supplement	
Appendix F: Alignment with Science Standards and Benchmarks	105