

# Now Hear This . . .

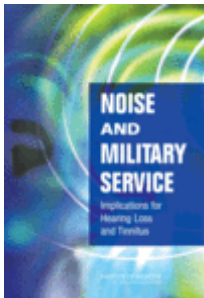


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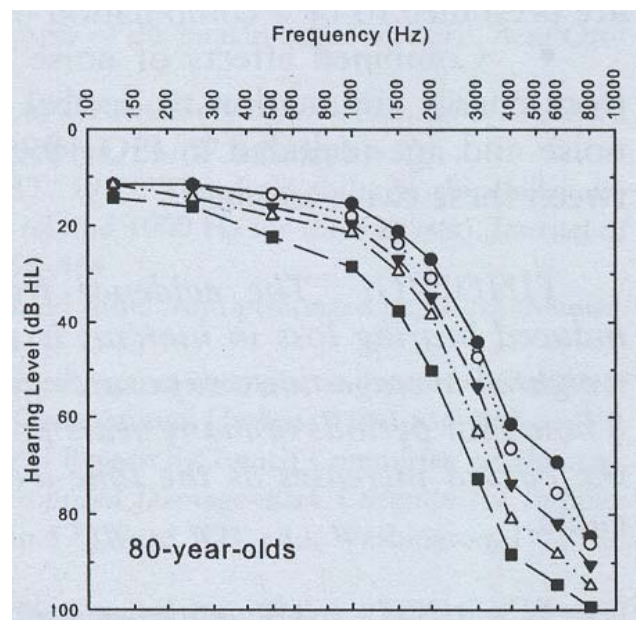
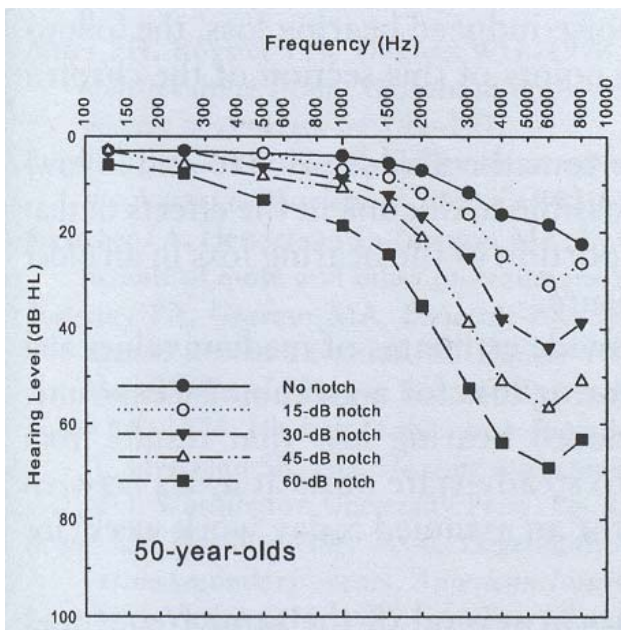
Spring 2006

## Noise and Military Service

The Institute of Medicine of the National Academies was contracted by the Veteran's Administration to examine noise hazards associated with military service and to provide guidelines for the Veteran's Administration on determining whether hearing and/or tinnitus in veterans is attributable to military service. A copy of the 336-page book, Noise and Military Service. Implications for Hearing Loss and Tinnitus can be purchased for \$54 or read on line for free at <http://darwin.nap.edu/books/0309099498/html/>



The conclusions of the book are directly applicable to the 25 million people who have served in the U.S. Military during World War II up to the present, including those currently in the military. The reasoning of the committee and evaluation of how to determine whether hearing loss should be attributed to noise exposure versus aging is useful not only for veterans but for all individuals with noise exposure from any source (Chapter 2 of the report). The two figures shown in this newsletter combine the predicted effects of aging and noise exposure, one for 50-year old men and the other for 80-year old men. With age there is the convergence of predicted hearing loss so that both the pattern and



Combined effects of aging and noise exposure using the ISO-1999/ANSI S3.44 model for additivity. Each figure depicts the combined hearing loss for a separate decade, 50 and 80 year old men.

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severity of hearing loss at the age of 80 shows very little difference regardless of whether noise or aging is the predominant cause. At age 50, a noise notch is present and hearing loss is more severe for those with noise exposure than the change expected with aging alone. How does one know if a patient's hearing loss is related to noise or even more specifically to noise at work? This is a difficult question to answer. There is no definite answer but the committee's conclusions from Chapters 2 and 4 from the report (quoted below) are helpful for approaching this issue. More explanation is in the text of the chapters.

"Chapter 2: Noise-Induced Hearing Loss

- The evidence from laboratory studies in humans and animals is sufficient to conclude that the most pronounced effects of a given noise exposure on pure-tone thresholds are measurable immediately following the exposure, with the length of recovery, whether partial or complete, related to the level, duration, and type of noise exposure. Most recovery to stable hearing thresholds occurs within 30 days.
- There is not sufficient evidence from longitudinal studies in laboratory animals or humans to determine whether permanent noise-induced hearing loss can develop much later in one's lifetime, long after the cessation of that noise exposure. Although the definitive studies to address this issue have not been performed, based on the anatomical and physiological data available on the recovery process following noise exposure, it is unlikely that such delayed effects occur.
- Nonacoustic factors may interact with the effects of noise to increase the measured noise-induced hearing loss. For many exogenous factors, evidence in animal models reveals that the effects of drugs or chemical agents may combine in

an additive or synergistic manner with the effects of noise to increase noise-induced hearing loss. In particular, aminoglycosides, cisplatin, and solvents (toluene and styrene) interact in laboratory animals with noise presented simultaneously or sequentially to increase the amount of noise-induced hearing loss. However, there is not sufficient evidence to confirm this finding in humans. In particular, the evidence is not conclusive in humans with regard to additive or synergistic effects of noise and the following exogenous factors on hearing: aminoglycosides, cisplatin, diuretics, salicylates, solvents, carbon disulfide, carbon monoxide, cigarette smoking, whole-body vibration, body temperature, exercise and electromagnetic fields.

- Several endogenous factors have been examined, including (old) age, gender, race, eye color, and prior hearing loss, but there is not sufficient evidence in humans to conclude that any of these factors predicts susceptibility to noise-induced hearing loss.
- The evidence from cross-sectional studies of noise-induced hearing loss in humans is sufficient to conclude that daily time-weighted average noise exposures greater than approximately 85 dBA for 8 hours for periods of many years pose a hazard to human hearing and that the hazard increases as the time-weighted average exposure exceeds this value.
- The evidence is not sufficient to determine the probability of acquiring a noise-induced hearing loss, or to estimate the magnitude of the noise-induced hearing loss, that a specific *individual* is likely to experience from a given noise exposure."

Chapter 4: Tinnitus

- The evidence is sufficient to conclude that noise doses associated with hearing loss are likely to be associated with tinnitus.
- The evidence was not sufficient to reach conclusions regarding the specific number or proportion of service members, overall or in specific branches or occupational groups, who report that tinnitus began or was exacerbated by noise exposure during military service.
- There is limited or suggestive evidence that exposure to impulse noise is associated with a greater likelihood of having tinnitus compared with exposure to steady-state noise.
- The evidence is sufficient to conclude that hearing loss (hearing thresholds greater than 25 dB HL at one or more audiometric frequencies between 250 and 8000 Hz) is associated with a higher prevalence of tinnitus.
- The evidence is not sufficient to determine precisely the magnitude of the risk of tinnitus associated with hearing loss."

The other chapters conclude that the hearing conservation programs of the US Military Services have not been adequate in the past and remain inadequate for current members of the armed forces.

- "The evidence reviewed by the committee—including information on the effectiveness of available hearing protection devices and indicators regarding use of hearing protection, the completeness of audiometric monitoring, and compliance with requirements for entrance and separation audiograms—was sufficient to conclude that hearing conservation programs in the military are currently not adequate to protect the hearing of military service members, and have not been adequate for the period since World War II. This has important human health, personnel readiness and financial implications."

This last conclusion is disheartening in light of the resources available to the military; yet still there is not enough priority and resources devoted to hearing conservation to protect against hearing loss.

We remain interested in receiving your reports where work has contributed to your patient's hearing loss. This includes noise exposure from time in the military.

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*Now Hear This...*

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**Address service requested.**

In this issue:  
Noise and Military Service

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**Michigan Law Requires the  
Reporting of Known or Suspected  
Occupational NIHL**

Reporting can be done by:

**Internet**

www.oem.msu.edu

**E-Mail**

ODREPORT@ht.msu.edu

**FAX**

517-432-3606

**Telephone**

1-800-446-7805

**Mail**

MIOSHA-MTS Division

P.O. Box 30649

Lansing, MI 48909-8149

**Suggested Criteria for Reporting  
Occupational NIHL**

1. A history of significant exposure to noise at work; AND
  2. A STS of 10 dB or more in either ear at an average of 2000, 3000 & 4000 Hz. And the employee's total hearing level is 25 dB or more at the same three frequencies. OR
  3. A fixed loss.\*
- \*Suggested definitions: a 25 dB or greater loss in either ear at an average of: 500, 1000 & 2000 Hz; or 1000, 2000 & 3000 Hz; or 3000, 4000 & 6000 Hz; or a 15 dB or greater loss in either ear at an average of 3000 & 4000 Hz.

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