Now Hear This . . .

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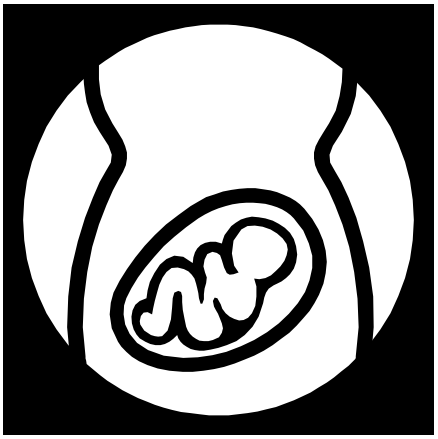
Noise and the Pregnant Woman

It is estimated that there are at least 200,000 Michigan workers exposed to daily noise levels of 85 dBA or greater at their place of employment. Many of these workers are women. Ideally these women are in hearing conservation programs and are wearing hearing protection. What should these women be advised when they become pregnant?

The human cochlea and ears develop by 24 weeks of gestation. By 28 weeks of gestation, the auditory pathways are consistently functioning. The initial threshold of hearing of the fetus is greater than the adult, 40 dB. This value reduces to 13.5 dB by 42 weeks of gestation.



Sound is easily transmitted to the fetus; one to four seconds of 100 to 130 dB of 1220 to 15000 Hz sound is used clinically to document fetal well-being.

In one study a hydrophone was placed in the uterus of eight women during delivery. Low frequency sounds (125 Hz) were enhanced at an average of 3.7 dB while at high frequency (4000 Hz) there was attenuation up to 10 dB (1).

There has been one study of the hearing of children born to mothers exposed to noise during pregnancy. A study of 131 children ages 4-10 from Quebec showed a 3-fold increased risk of high-frequency hearing loss in children whose mothers had been exposed to 85-95 dB, particularly if these exposures involved a strong component of low-frequency noise.

Animal studies have shown increased sensitivity of the developing cochlea to noise-induced damage (2).

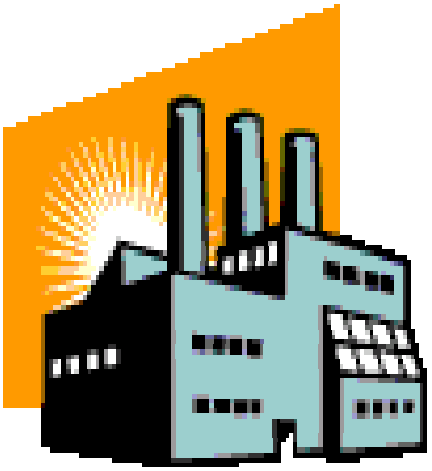
The literature on the adverse effect of noise on pregnant women is more extensive for outcomes of birth defects, shortened gestation and decreased birth weight. These studies were done both on

pregnant women exposed to noise at work and in relationship to environmental noise from living near airports. The results of the studies have been mixed, some finding associations and others showing no effect (3).

What recommendations should be made to pregnant women? The English abstract of a German article from 1997 states that "Health legislation laws in most countries forbid pregnant women to work in surroundings with a high noise level (80 dB continuous noise and/or rapid impulse noise changes of 40 dB)." There are no such regulations in Michigan or the rest of the United States.

The Committee of the Environment of the American Academy of Pediatrics concluded: "Exposure to excessive noise during pregnancy may result in high-frequency hearing loss in newborns, and may be associated with prematurity and intrauterine growth retardation." Their only clinical recommendation was: "Pediatricians are encourage to consider screening, for noise-induced hearing loss, those infants who were exposed to excessive noise in the uterus . . ." Other recommendations relate to more research and that OSHA "should consider pregnancy in setting their occupational noise standards." To date, OSHA has not considered pregnancy in their noise standard.

The best summary of the data on the issue of pregnancy and noise can be found in reference 3. There is no definitive conclusion and individual recommendations in clinical settings will need to be made in the face of uncertainty.



References

1. Richards DS, Frentzen B, Gerhardt KJ, McCann ME, Abrams RM. Sound Levels in the Human Uterus. Obstetrics and Gynecology 1992; 80:186-199.

2. Lalande MN, Hetu R, Lambert J. Is Occupational Noise Exposure During Pregnancy a Risk Factor of Damage to the Auditory System of the Fetus? American Journal of Industrial Medicine 1986; 10:427-435.

3. American Academy of Pediatrics. Noise: A Hazard for the Fetus and Newborn. Pediatrics 1997; 100:724-727.

Resources on Noise-Induced Hearing Both at Work and in the Environment

⇒ Position Statement of Occupational and Environmental Medicine on Noise-Induced Hearing Loss
www.acoem.org/guidelines/article.asp?ID=53

⇒ WiseEars Homepage of the National Campaign to Prevent Noise-Induced Hearing Loss of the National Institute on Deafness and Other Communicative Disorders
www.nidcd.nih.gov/health/wise/index.asp

⇒ Annual Reports on Work-Related Noise-Induced Hearing Loss in Michigan
www.chm.msu.edu/oem

⇒ NOISH Homepage on Hearing Loss Prevention
www.cdc.gov/niosh/topics/noise

⇒ National Institute for Occupational Safety and Health. Criteria for Recommended Standard. Occupational Noise Exposure Revised Criteria 1998. June 1998, DHHS (NIOSH) Publication No. 98-126

New Hearing Loss Recording Rules

Beginning January 1, 2003, the criteria changed regarding when employers are required to record work-related hearing loss cases.

An employee's hearing loss must be recorded if a standard threshold shift (STS) is detected after performing an employee's annual hearing test and there is also a fixed hearing loss. The definition of an STS did not change. An STS is defined as a change in the hearing threshold relative to the baseline audiogram of an average of 10 decibels (dB) or more at the following tones, 2000, 3000, and 4000 Hertz.

But starting January 1, 2003, the additional criteria on a fixed loss was added. The STS will be recordable only if the hearing loss is at least 25 dB above audiometric zero, averaged over the three tone frequencies of 2000, 3000, and 4000 Hz. Before recording, employers can make adjustments for hearing loss caused by aging, seek the advice of a physician or licensed health care professional to determine if the loss is work-related, and perform additional hearing tests to verify the persistence of the hearing loss. If testing reveals that an employee has sustained a hearing loss equal to an STS, the employer must take protective measures, including requiring the use of hearing protectors, to prevent further hearing loss.

The additional requirement of a fixed loss will reduce the number of work-related hearing reports recorded by employers.

For questions on the recording of hearing loss, contact the MIOSHA Information Division at (517) 322-1851.

Now Hear This...

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Address service requested.

In this issue:
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Michigan Law Requires the Reporting of Known or Suspected Occupational NIHL

Reporting can be done by:

FAX
517-432-3606

Telephone
1-800-446-7805

E-Mail
ODREPORT@ht.msu.edu

Web
www.chm.msu.edu/oem

Mail
MDCIS Occ Health Div
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. 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.