

New and Improved Ways to Report Known or Suspected Occupational Disease

We have created a *secure* web site to accept on-line reporting and have established a new e-mail address strictly dedicated to the reporting of all occupational disease. If you want to report on-line, go to our web site www.chm.msu.edu/oem/index.htm and click on 'Submit Occupational Disease Report'. Please see box on page 4 for various ways to report Known or Suspected Occupational Disease. If you have any questions about Michigan's reporting law or how to report, please call 1-800-446-7805 or e-mail ODREPORT@ht.msu.edu

What is the Normal Value for Blood Lead?

Laboratories are required to report to the state the results of *all blood lead tests*, whether performed on children or adults. These blood tests are performed by local health departments, private practitioners and companies as part of their occupational health program.

The Centers for Disease Control and Prevention (CDC) has developed guidelines for reporting the laboratory results of blood leads in children (Table I). Lead has no biological function in the body and accumulates over time with continued exposure. Ideally, lead levels would be nondetectable, but because of the previous widespread use of lead, particularly in paint and gasoline, both children and adults will have background values of lead in their blood. The best data for assessing what is a normal background level for lead comes from the National Health and Nutrition Examination Surveys, which is an ongoing program of the National Center for Health Statistics. This program performs medical

examinations and testing on a random sample of the United States population and generates "normal" values for many different parameters. Table II shows "normal" levels of blood lead by age, gender and race. Both for children and adults, all but five percent of the population has a blood lead <10 ug/dL. This five percent cutoff is the usual method for determining laboratory normal ranges.

CDC has not developed management guidelines for lead for adults. This lack of guidelines is reflected in the normal range that laboratories report for adults. Table III shows the normal range for the twelve laboratories in the state that perform blood lead analysis. Four of them use the same normal range for adults as for children, while the other eight indicate an upper limit of normal that ranges from 19-40 ug/dL. Part of the confusion in the upper limit of normal for adults is based on the allowable Occupational Safety and Health Act (OSHA) blood levels. OSHA allows blood lead levels in workers to be up to 49 ug/dL before an employer is required to remove the individual from work. If a blood lead is 40 ug/dL or greater, then OSHA requires that blood lead monitoring be performed more frequently, every two months. Lead accumulates in the body and there is consistent evidence of the adverse effects of lead at levels within allowable OSHA standards. The OSHA allowable blood lead standard was last revised in 1978. This is particularly true for the association with blood pressure, kidney disease, neurological function and semen quality for exposures causing blood lead levels below 40 or 50 ug/dL.¹⁻⁵

Depending on why a blood lead was ordered, an upper limit of normal greater than 10 ug/dL is misleading. Any blood lead result above 10 ug/dL indicates exposure beyond that expected in the general population. Because lead accumulates in the body, exposures leading to blood lead levels ≥ 10 ug/dL increase the risk for developing high blood pressure and kidney, neurologic and sperm

dysfunction. The California Health Department has disseminated the following table for managing blood lead in adults (Table IV). We believe that these guidelines for managing blood lead levels in adults are reasonable and justified by the medical literature. We are encouraging the laboratories to change their upper limit of normal for blood lead to 9 ug/dL for *individuals of all ages*.

If you have questions about interpreting blood lead results or managing patients with lead exposure or elevated blood lead levels, please contact Kenneth D. Rosenman, M.D. at 1-800-446-7805 or e-mail: Rosenman@msu.edu

Table I. Management Guidelines for Blood Lead Levels in Children*

Blood lead (ug/dL)	Significance	Management
<10	Background	Guidance and well-child care
10-14	Low	For 10 or higher, tiered management according to CDC guidelines
15-19	Mild	
20-44	Moderate	For 20 or higher, public health and medical evaluation and treatment (see CDC guidelines)
45-69	High	For 45 or higher, chelation recommended
≥ 70	Severe	Medical emergency

*Centers for Disease Control & Prevention (CDC). Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials. Atlanta, GA: US Department of Health and Human Services, 1997.

Table II. Blood Lead Levels of the Population by Selected Demographic Characteristics: United States 1991-1994

Population Group	Geometric Mean Blood Lead Level (ug/dL)	Percent Persons with Blood Lead Levels ≥ 10 ug/dL		
		CI*		CI*
All	3.3	2.1-2.4	2.2	1.6-2.8
Age (years)				
1-2	3.1	2.8-3.5	5.9	3.7-9.2
3-5	2.5	2.3-2.7	3.5	2.2-5.4
6-11	1.9	1.8-2.1	2.0	1.2-3.3
12-19	1.5	1.4-1.7	0.8	0.3-1.9
20-49	2.1	2.0-2.2	1.5	1.0-2.2
50-69	3.1	2.9-3.2	2.9	2.1-3.8
≥70	3.4	3.3-3.6	4.6	3.4-6.0
Sex				
Female	1.9	1.8-2.0	0.9	0.6-1.3
Male	2.8	2.6-2.9	3.5	2.6-4.6
Race/ethnicity				
Black, non-Hispanic	2.8	2.6-3.0	5.2	4.0-6.9
Mexican American	2.4	2.3-2.6	2.9	2.1-4.0
White, non-Hispanic	2.2	2.0-2.3	1.5	0.9-2.3
Other	2.3	2.1-2.6	3.0	1.7-5.1

*CI, 95% confidence interval.

(Adopted Pirkle et al 1998)

Table III. Normal Ranges for Adults in the Twelve Michigan Laboratories Performing BloodLead Analysis

Laboratory	Normal Range (ug/dL)
A	0 - 10
B	0 - 40
C	0 - 19; 0 - 39 occupational exposure
D	0 - 9
E	0 - 9
F	0 - 24
G	0 - 9; 0 - 30 occupational exposure
H	0 - 30
I	0 - 25
J	0 - 20
K	0 - 9
L	0 - 19

Table IV. Management Guidelines for Blood Lead Levels in Adults*

Blood Lead (ug/dL)	Management
<10	No action needed.
10-24	Identify and minimize lead exposure.
25-49	Remove from exposure if symptomatic Monitor blood lead and zinc protoporphyrin.
50-79	Remove from work with lead. Immediate medical evaluation indicated. Chelation not indicated unless significant symptoms due to lead poisoning.
≥ 80	As above. Chelation may be indicated if symptomatic. Important to consult on individual case basis.

*California Department of Health Services Occupational Lead Poisoning Prevention Program.

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Web www.chm.msu.edu/oem/index.htm

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Division of Occupational Health

P.O. Box 30649

Lansing, MI 48909-8149

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