

LEAD

Exposure in Adults

**A Guide for
Health Care Providers**

How Are Adults Exposed to Lead?

Lead exposure occurs when lead dust or fumes are inhaled, or when lead is ingested via contaminated hands, food, water, cigarettes or clothing. Lead entering the respiratory and digestive systems is released to the blood and distributed throughout the body. More than 90% of the total body burden of lead is accumulated in the bones, where it is stored. Lead in bones may be released into the blood, re-exposing organ systems long after the original exposure.

What Are the Adverse Health Effects That Lead Exposure Can Have on Adults?

The toxic nature of lead is well documented. Lead affects all organs and functions of the body to varying degrees. The frequency and severity of symptoms among exposed individuals depends upon the amount of exposure. The table below shows many of the key lead-induced health effects.

Neurological Effects

- ◆Peripheral neuropathy
- ◆Fatigue/Irritability
- ◆Impaired concentration
- ◆Hearing loss
- ◆Wrist/Foot drop
- ◆Seizures
- ◆Encephalopathy

Gastrointestinal Effects

- ◆Nausea
- ◆Dyspepsia
- ◆Constipation
- ◆Colic
- ◆Lead line on gingival tissue

Reproductive Effects

- ◆Miscarriages/Stillbirths
- ◆Reduced sperm count & motility
- ◆Abnormal sperm

Heme Synthesis

- ◆Anemia
- ◆Erythrocyte protoporphyrin elevation

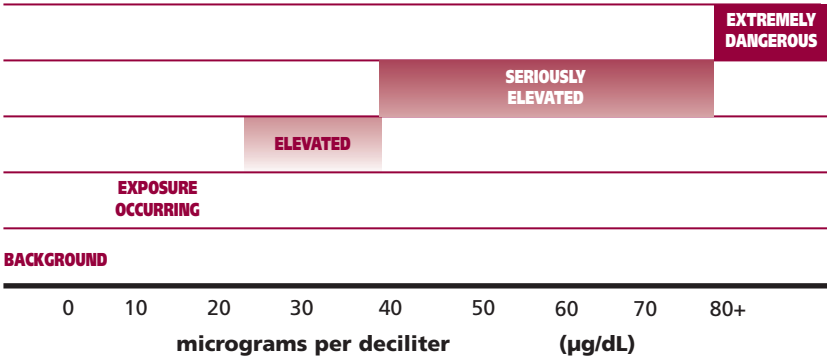
Renal Effects

- ◆Chronic nephropathy with proximal tubular damage
- ◆Hypertension

Other

- ◆Arthralgia
- ◆Myalgia

What Lead Levels Are Considered Elevated in Adults?



- ◆ At levels above 80 µg/dL, serious, permanent health damage may occur (extremely dangerous).
- ◆ Between 40 and 80 µg/dL, serious health damage may be occurring, even if there are no symptoms (seriously elevated).
- ◆ Between 25 and 40 µg/dL, regular exposure is occurring. There is some evidence of potential physiologic problems (elevated).
- ◆ Between 10 and 25 µg/dL, lead is building up in the body and some exposure is occurring.

The typical level for U.S. adults is less than 10 µg/dL (mean = 3 µg/dL).

What is the Health Care Provider’s Role?

- ◆ All health care providers should be aware of the Occupational Safety and Health Administration (OSHA) General Industry Lead Standard (29CFR1910.1025) and the Construction Lead Standard (29CFR1926.62). Providers who are in a contractual arrangement with an employer should know their responsibilities to the employer and workers.
- ◆ NYS law requires all laboratories to report all blood lead levels to the New York State Department of Health. The health care provider should assure that all of the information required by the laboratory is completed for all blood lead analyses ordered and that this information accompanies the sample to the testing laboratory.

◆ If lead exposure is suspected, the patient's medical evaluation should include:

- An occupational and environmental history with attention to possible lead exposure. **There are certain jobs, hobbies, foods and folk medicines that are more likely to be associated with lead. These should alert the Health Care Provider to the possibility of lead exposure.**
- Laboratory testing for blood lead and ZPP levels
- If the laboratory tests are elevated, then a comprehensive physical exam that includes laboratory testing for:
 - hemoglobin, hematocrit, red blood cell indices
 - examination of peripheral smear morphology, BUN and serum creatinine
 - routine urinalysis with microscopic examination
 - pregnancy or male fertility, if requested by employee

◆ Ongoing Biological Monitoring for Exposure

Blood lead levels can rise quickly. With frequent monitoring of blood lead levels, dangerous exposures can be quickly identified and corrected, workers can be protected, and the need for OSHA-mandated medical removal of workers can be avoided. A blood lead level over 25 µg/dL shows that substantial exposure to lead is occurring. There is also increasing evidence that health effects may occur at this blood lead level.

Based on this information, the New York State Department of Health encourages employers to consider more frequent testing than required by OSHA, and the tracking of blood lead levels over time to identify trends. The following guidelines for testing were developed with the New York State Occupational Health Clinic Network. These occupational health clinics provide state of the art diagnostic and treatment services to New York State workers with occupationally related disease. The guidelines meet the OSHA standards and provide more information to the employer and employees to help control dangerous exposures.

Voluntary Guidelines for the Control of Lead in the Workplace*

- ◆ First, test each worker before they begin any work involving lead
- ◆ Then test that worker every month:
 - For the first 3 months of testing, and
 - Whenever the previous blood lead level was greater than 25 µg/dL (***If the previous blood lead level was at least 50 µg/dL, a follow-up test within 2 weeks and medical removal is required***), or
 - Whenever an increase of at least 10 µg/dL from the previous test is observed
- ◆ After the first three months, continue testing every 2 months:
 - When the blood lead levels have remained below 25 µg/dL for 3 months, and
 - If an increase less than 10 µg/dL from the previous test is observed
- ◆ Test every 6 months:
 - When the blood lead levels remain below 25 µg/dL for 6 months, and
 - If an increase less than 10 µg/dL from the previous test is observed

Results of each test should be provided to the worker. Tracking the test results can help the employer and the worker identify whether blood lead levels are dropping, remaining stable or increasing. The employer should also review the test results for all workers to help identify jobs where problems may be occurring.

**These guidelines exceed OSHA requirements for medical monitoring.*

If you see a case of lead poisoning or overexposure, there may be more nearby! Find out if there are other adults or children who are being exposed at work or at home.

What Are the Treatment Issues to Be Considered For Adults?

When lead poisoning has been diagnosed, the first course of action is to discontinue exposure. Whether discontinuation of exposure is sufficient to treat the poisoning depends on the blood lead level, severity of clinical symptoms, biochemical and hematologic disturbances, and the nature and history of exposure. All of these factors must be considered in determining the necessity for chelation therapy. There is no exact blood lead concentration above which treatment with a chelating agent is always indicated. In most cases, however, when a blood lead level rises to 80 $\mu\text{g}/\text{dL}$, chelation should be considered, especially in the presence of more severe signs and symptoms. Therapeutic chelating agents have potentially adverse side effects and should be used cautiously and on an individual basis. A single course of chelation may not sufficiently reduce blood lead levels and repeat courses may be required among heavily exposed individuals.

***Remember:** The exposure **must** first be discontinued before initiating chelation therapy.*

What is “Take Home” Lead?

Lead particles or dust can be brought into the home and family vehicle on work clothes and equipment. This is called “take home” lead and it can harm anyone who is exposed.

Since blood borne lead crosses the placenta, a pregnant woman with an elevated blood lead level may expose her fetus to the toxic effects of lead. All women should receive guidance on preventing lead poisoning before and during pregnancy.

Lead poisoning in children is especially dangerous because it can cause learning problems and serious illness. If **young children** live in the home and a parent **works with lead**, they should be tested.

What Are Some Sources of Lead Exposure?

Occupational

- ◆ Construction workers
- ◆ Steel welders
- ◆ Bridge reconstruction workers
- ◆ Firing range instructors and cleaners
- ◆ Painters
- ◆ Remodelers and refinishers
- ◆ Foundry workers
- ◆ Scrap metal recyclers
- ◆ Auto repairers
- ◆ Cable splicers

Hobbies

- ◆ Casting bullets or fishing sinkers
- ◆ Home remodeling
- ◆ Target shooting at firing ranges
- ◆ Lead soldering
- ◆ Auto repair
- ◆ Stained glass making
- ◆ Glazed pottery making

Substance Use

- ◆ Some folk remedies
- ◆ Some “Health Foods”
- ◆ Moonshine whiskey
- ◆ Ceramicware

How Can Your Patients Reduce Their Exposure to Lead?

Tell your patients to:

- ◆ **Wash** their hands and face before they eat, drink or smoke.
- ◆ **Eat, drink and smoke** only in areas free of lead dust and fumes. Store food and tobacco in clean areas.
- ◆ **Wear** a clean, properly fitted respirator with HEPA filter in all areas that have lead dust or fumes. Shave to get the best fit.
- ◆ **Change** into different clothes and shoes before engaging in work with lead. Keep their street clothes and shoes in a clean place.
- ◆ **Shower** after working with lead before they go home.
- ◆ **Launder** their clothes separately from other family members’ clothes.

Where Can a Health Care Provider Get Further Information?

New York State Department of Health. The Health Department can provide guidance, information and technical assistance to you on many occupational health issues. Further information is also available on the treatment of children and women. (www.health.state.ny.us)

(800) 458-1158 extension 27900

U.S. Occupational Safety and Health Administration (OSHA). If you feel that an employer does not adequately address a safety or health hazard, you have the right to request an inspection by OSHA. In filing a complaint, you can ask OSHA to withhold your identity from your employer.

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| <i>Albany</i> | <i>(518) 464-4338</i> | <i>Syracuse</i> | <i>(315) 451-0808</i> |
| <i>Buffalo</i> | <i>(716) 551-3053</i> | <i>Tarrytown</i> | <i>(914) 524-7510</i> |
| <i>Long Island</i> | <i>(516) 334-3344</i> | <i>Queens</i> | <i>(718) 279-9060</i> |
| <i>Manhattan</i> | <i>(212) 620-3200</i> | | |

Further information can be obtained from OSHA’s website at www.OSHA.gov.

New York State Department of Labor. If you are treating a public employee (works for State, county or city offices), OSHA standards are enforced by the New York State Department of Labor Public Employee Safety and Health (PESH) program. These offices should be contacted if you would like to request a consultation to identify and correct specific hazards and to provide guidance in developing an effective safety and health program, or if you wish to file a complaint for public employees.

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| <i>Albany</i> | <i>(518) 457-5508</i> | <i>Rochester.</i> | <i>(585) 258-4570</i> |
| <i>Binghamton</i> | <i>(607) 721-8211</i> | <i>Syracuse</i> | <i>(315) 479-3212</i> |
| <i>Buffalo</i> | <i>(716) 847-7133</i> | <i>Utica</i> | <i>(315) 793-2258</i> |
| <i>Garden City</i> | <i>(516) 228-3970</i> | <i>White Plains</i> | <i>(914) 997-9514</i> |
| <i>New York City</i> | <i>(212) 775-3548</i> | | |

Occupational Health Clinic Network

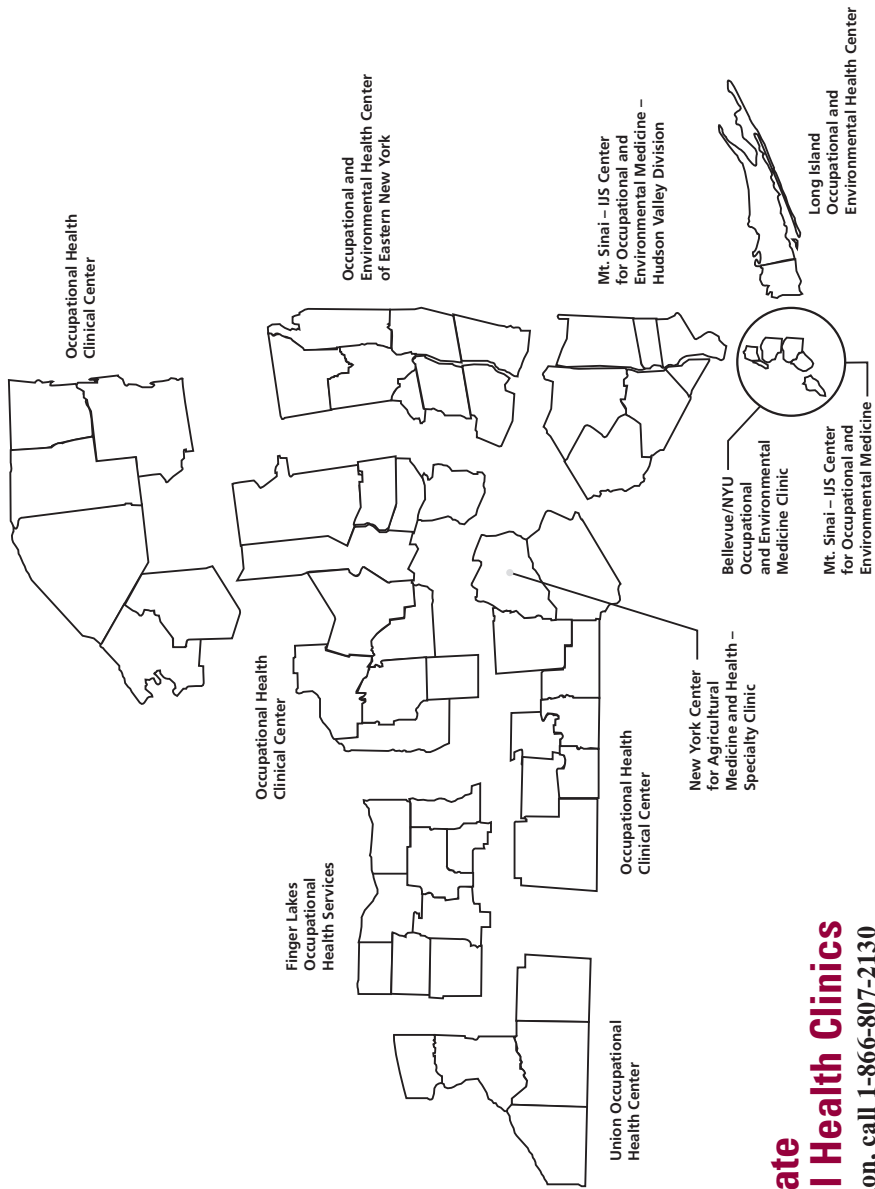
The New York State Network of Occupational Health Clinics provides medical and educational services for workers exposed to workplace hazards. (See map on following page.) www.nyhealth.gov/nysdoh/environ/occupate.htm

References:

Hipkins KL, Materna BL, Kosnett MJ, Rogge JW, Cone JE. Medical Surveillance of the Lead Exposed Worker. *AAOHN Journal* 46(7): 330-339, 1998.

Rempel D. The Lead-Exposed Worker. *JAMA* 262(4):532-534, 1989.

US Department of Labor, OSHA. Lead in Construction. *OSHA* 3142, 1993.



**New York State
Occupational Health Clinics**
For more information, call 1-866-807-2130



State of New York
Department of Health