

The Global Lead Advice and Support Service (GLASS) provides information and referrals on lead poisoning and lead contamination prevention and management, with the goal of eliminating lead poisoning globally and protecting the environment from lead.

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**global lead advice
& support service**

Lead poisoning and menopause: how similar are they? Does lead make menopause worse?

By Dana Lintea, Edited by Anne Roberts. July 2010

When someone is [exposed to or consumes lead](#)¹, most of it is stored in the bones.

“Lead is a bone-seeking element. Over 90 percent of the total burden of lead in the body resides in the skeleton, where it has a half-life on the order of years to decades. Thus, exposure to lead over the course of a lifetime results in accumulation of lead in the skeletal compartment such that bone lead levels are generally higher among older persons. Mineral (i.e. lead) absorption and resorption [the recycling of calcium and other minerals including lead from the bone to the bloodstream] from the human skeleton are affected by many factors, including age, diet, weight-bearing activity, trauma, metabolic disorders, hormonal status, pregnancy, lactation, and menopause.”² [Note: With regards lead, half-life refers to the time when half the stored lead has left wherever it was stored. In the case of lead stored in bones, the lead leaving the bones is entering the blood.]

“Several population based studies have revealed differences in blood lead levels in women and this change coincides with the age of the menopause, which has generated a hypothesis, that lead stored in bone may be mobilized during the peri-menopausal period [the time of transition to menopause], when many women lose bone density (Silbergeld, et al 1987).”³ Lead competes with calcium for transport and binding sites, and when calcium is released from bone, so is lead. Once in the blood, lead's poisonous effects spread throughout the body. Research by Silbergeld and others shows that lead may contribute to many ailments associated with aging: hypertension, kidney disease and possibly dementia.

With respect to the menopause a question logically arises: **Does lead make menopause worse?**

¹ <http://www.lead.org.au/fs/fst2.html>

² “Bone Density-related Predictors of Blood Lead Level among Peri- and Postmenopausal Women in the United States. The Third National Health and Nutrition Examination Survey, 1988–1994”. Denis Nash^{1,2}, Laurence S. Magder², Roger Sherwin³, Robert J. Rubin⁴, and Ellen K. Silbergeld^{2,4} American Journal of Epidemiology 2004 <http://aje.oxfordjournals.org/cgi/content/short/160/9/901>

³ The Environment and Womens Health by Ellen K. Silbergeld, PhD, and Jenna S. Roberts, Msc, in collaboration with the Center for Research on Women and Gender, the University of Illinois at Chicago. Paper From: Canada-U.S.A. Women's Health Forum August 8 - 10, 1996 in Ottawa, Canada

Lead poisoning symptoms manifest in many ways and in any system of the human body, e.g., digestive system, nervous system, circulation⁴ etc. Similar symptoms which may be experienced by a menopausal woman are: aches and pains, urinary frequency, tiredness, irritability and depression⁵. It is a rather difficult task to identify a symptom as a direct effect of lead poisoning, if we take into account the complexity of the internal processes triggered by the menopause, and in some cases a pre-existing medical condition.

So far, observational studies (see footnote 2 and 3) have clearly shown an increased level of lead in menopausal women. Silbergeld's research shows that postmenopausal women have significantly more blood lead than younger women, even when they have had no additional environmental exposure. Blood lead levels may rise as much as 25% in the five years after menopause.

On-going research tries to bring more information on the “significance of the bone as a target of lead toxicity as well as a reservoir of systemic lead”⁶.

Considering these well-established facts that the lead is stored in the bones and that during the menopause the bones lose calcium, and along with it the lead stored (if exposure to lead has occurred), the immediate answer to the question “*Does lead make menopause worse?*” is “most probably yes”.

There are several aspects of the menopause that play a role in the body's defence against lead toxicity.

“In humans, menopause is the time in a woman's life when her reproductive cycles end. During this transition, the ovaries start producing lower levels of natural sex hormones—estrogen and progesterone. Estrogens have a protective effect on bone density which becomes evident after menopause when women begin to lose calcium from their bones at a faster rate than men of the same age.”⁷

Would Hormone Replacement Therapy be beneficial in this regard? Here's what *Nash et al 2004*² have found: “Women who were current users of HRT had adjusted blood lead levels lower than those of past or never users, independently of age. This observation is consistent with the findings of other investigators⁸ and supports the hypothesis that blood lead levels among postmenopausal women are partly driven by factors that affect bone loss. However, the possibility cannot be ruled out that differing lead exposure profiles between these groups of women were responsible for the observed effect, despite our attempt to control for this through multivariate adjustment for factors known to be associated with lead

⁴ <http://www.lead.org.au/fs/fst7.html>

⁵ <http://www.managingmenopause.org.au/content/view/92/108/>

⁶ <http://www.springerlink.com/content/f1574761rm273t4k/>

⁷ <http://www.endocrineweb.com/osteo.html>

⁸ Korrick SA, Schwartz J, Tsaih SW, et al. Correlates of bone and blood lead levels among middle-aged and elderly women. *Am J Epidemiol* 2002;156:335–43 . <http://aje.oxfordjournals.org/cgi/reprint/156/4/335>

exposure. Women who choose to use HRT may be different from women who do not with regard to many health behaviors and exposures, both known and unknown⁹. However, it is unlikely that this is the only explanation, since no differences between former users and never users of HRT were observed after multivariate adjustment.”

Other considerations:

“Calcium levels are regulated by the parathyroid glands. Through the secretion of parathyroid hormone (PTH), these four small glands regulate how much calcium is absorbed from our diet, how much calcium is secreted by our kidneys, and how much calcium is stored in our bones. We store many pounds of calcium in our bones, and it is readily available to the rest of the body at the request of the parathyroid glands. Now the problem becomes apparent. Overactive parathyroid glands secrete too much parathyroid hormone. This causes calcium to leave the bones and go into the blood. The bones become osteoporotic and prone to fractures. The problem is amplified greatly in post-menopausal women since this process is ongoing already!”¹⁰

“These findings suggest that high bone density is a feature of hypoparathyroidism per se and that postmenopausal bone loss may be significantly attenuated in this condition.”¹¹ [Hypoparathyroidism is a condition in which the body doesn't make enough parathyroid hormone. This hormone regulates the amount of calcium and phosphorus in the bones and blood.] Dr. Norman¹⁰ states that “fixing the overactive parathyroid gland helps the osteoporosis” and stops the continuous loss of calcium. [The body can't distinguish between lead and calcium. When calcium is being lost from bones, lead is also being “lost” as well.] As a defence against lead toxicity at the time of menopause this would be a beneficial finding.

DISCLAIMER:

The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

⁹ Barrett-Connor E. Postmenopausal estrogen and prevention bias. *Ann Intern Med* 1991;115:455–6.
<http://www.annals.org/content/116/3/268.1.short>

¹⁰ James Norman MD, FACS, FACE, The Norman Parathyroid Clinic, Tampa, FL. Dr. Norman is a member of the [EndocrineWeb Editorial Board](http://www.endocrineweb.com/osteo.html). <http://www.endocrineweb.com/osteo.html>

¹¹ High peripheral and axial bone densities in a postmenopausal woman with untreated hypoparathyroidism. B. Orr-Walker, R. Harris, I. M. Holdaway, G. Foote, I. R. Reid. *Postgrad Med J* (1990) 66, 1061 – 1063.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2429790/pdf/postmedi00168-0076.pdf>