

New inorganic lead-monitoring guidelines

Lead (Pb) is the quintessential heavy metal with toxic properties that have been recognized for centuries. It's a naturally occurring, nonessential element with well-defined dose-toxic effect relationships. Adverse health effects may start with blood lead levels (BLL) as low as 0.48 µmol/L (10 µg/dL)* in adults. The 95th percentile for BLL for Canadian adults is approximately 0.2 to 0.3 µmol/L. Adverse health effects associated with elevated lead exposure include hypertension and anemia, as well as renal, gastrointestinal, reproductive, and central and peripheral nervous system dysfunction. The International Agency for Research on Cancer has deemed lead a probable carcinogen.

Inorganic lead is absorbed by inhalation or ingestion. Signs and symptoms of lead exposure vary with

the dose and duration of exposure. They are typically nonspecific and can include fatigue, myalgia, arthralgia, irritability, lethargy, abdominal discomfort or pain, tremors, headaches, constipation, and difficulty concentrating. More extreme exposures can result in encephalopathy with seizures, altered consciousness, coma, and death. Enquiring about workplace activity and exposure can identify lead exposure as a possible contributing factor. For additional information on lead toxicity and management, see the suggested reading.

Lead exposure in the workplace

Lead exposure still occurs in many workplaces in BC, and every year WorkSafeBC adjudicates claims for exposure and toxicity. Exposure situations vary from law enforce-

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ment officers doing target practice, to workers at battery recycling facilities or radiator repair shops, welders dismantling lead painted bridges, metal refinery workers, grinders of fishing lead lures, and others. WorkSafeBC requires that employers have an exposure control program for lead-exposed workers.

Exposure control programs typically include biological monitoring for lead by measuring BLL. WorkSafeBC guidelines for BLL monitoring were summarized in a prior article in the *BCMJ* (2009;51:388). The guidelines were based on the American Occupational Safety and Health Administration standards first enacted into law in 1978 for general industry. Many clinicians and researchers in the field of occupational medicine have advocated for a review of the older standards of practice because they are not considered to be sufficiently protective for workers with occupational lead exposure. Newer recommendations have been proposed to rectify this situation and better protect the health of workers. In response to these changes, WorkSafeBC is also updating its guidelines. These newer guidelines are summarized in the **Table**.

Table. Recommended actions for measured BLL.

Blood lead level	Retest recommendation	Recommended action
< 0.48 µmol/L (< 10 µg/dL)	None to annually.	No specific actions necessary.
0.48–0.96 µmol/L (10–19 µg/dL)	Every 6 months.	ALERT Minimize exposure by reviewing all sources of exposure and improving protective measures.
0.97–1.44 µmol/L (20–29 µg/dL)	Every 1 month.	REMOVAL 1. Remove worker from further lead exposure if a repeat test is greater than 0.97 µmol/L (20 µg/dL). 2. Return worker to previous duties when: - Blood lead level is acceptable to a physician, and - Exposure is minimized by reviewing all sources of exposure and improving protective measures.
≥ 1.45 µmol/L (≥ 30 µg/dL)	Monthly until the level is acceptable to a physician.	REMOVAL 1. Remove worker from further lead exposure. 2. Return worker to previous duties when: - Blood lead level is acceptable to a physician, and - Exposure is minimized by reviewing all sources of exposure and improving protective measures.

Note: Pregnant or breastfeeding women should be reassigned to tasks that do not involve lead exposure.

*In the past, BLL was reported in µg/dL, but now it is reported in µmol/L (1 µmol/L is approximately 20 µg/dL).

This article is the opinion of WorkSafeBC and has not been peer reviewed by the BCMJ Editorial Board.

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GP IN ONCOLOGY TRAINING Vancouver, 12–23 Sep (Mon–Fri), and 20 Feb–3 Mar 2017 (Mon–Fri)

The BC Cancer Agency's Family Practice Oncology Network offers an 8-week General Practitioner in Oncology training program beginning with a 2-week introductory session every spring and fall at the Vancouver Centre. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they may provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 6 weeks of customized clinic experience at the cancer centre where their patients are referred. These can be scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC's Enhanced Skills Program. For more information or to apply, visit www.fpon.ca, or contact Jennifer Wolfe at 604 219-9579.

SOUTH PACIFIC CRUISE

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The world's most romantic destinations, from French Polynesia to Fiji. Join us for a 13-night cruise exploring exotic Tahiti (where Captain Bligh's men mutinied to stay put), Mo'orea (Arthur Frommer's vote for "the most beautiful island on earth"), Taha'a (French Polynesia's vanilla-scented isle), Bora Bora (the celebrities' exclusive hideaway), the Cook Islands (New Zealand's private paradise), the Kingdom of Tonga (proudly never colonized), and three idyllic islands of Fiji (Viti Levu, Vanua Levu, and postcard-perfect Beqa). You'll be enchanted by the South Pacific's craggy volcanic peaks, sugary beaches, warm lagoons teaming with fish, glistening black

pearls, and tamure dancing suggestive enough to make you blush. The CME provides a rock-solid foundation in medical CBT for depression, reviewing a plethora of ultra-brief office techniques to defeat depression and be happy. CBT Canada is a national winner of the CFPC's CME Program Award, and is celebrating its 20th anniversary this year. Lead instructor Greg Dubord, MD, is a University of Toronto CME Teacher of the Year. Assistant faculty includes the inimitable Fijian psychiatrist Benjamin Prasad, MD, FRCPC, from the University of Manitoba. Super early bird rates for ocean-view staterooms aboard the spectacular m/s *Paul Gauguin* start at \$12 850 (which includes all beverages, all taxes, all gratuities, return airfares, and companion cruises free). Book with Canada's largest cruise agency, CruiseShipCenters. See CBT Canada at www.cbt.ca or call 888 739-3117.

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Further information

If you are concerned about the evaluation of a worker's exposure or BLL results, please contact a medical advisor in your nearest WorkSafeBC office.

—Sami Youakim, MDCM,
MSc, FRCPC

WorkSafeBC Medical Advisor

Suggested reading

Agency for Toxic Substances and Disease Registry. Case studies in environmental medicine, lead toxicity. Accessed 19 April 2016. www.atsdr.cdc.gov/csem/lead/docs/lead.pdf.

Friedman LS, Simmons LH, Goldman RH, et al. Case records of the Massachusetts General Hospital. Case 12-2014. A 59-year-old man with fatigue, abdominal pain, anemia, and abnormal liver function. *N Engl J Med* 2014;370:1542-1550.

Warniment C, Tsang K, Galazka SS. Lead poisoning in children. *Am Fam Phys* 2010;81:751-757.

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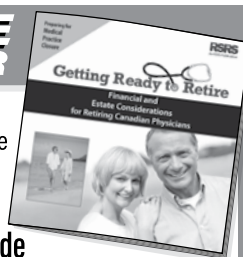
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