

HUMAN EXPOSURE TO LEAD AND NEW EVIDENCE OF ADVERSE HEALTH EFFECTS: IMPLICATIONS FOR ANALYTICAL MEASUREMENTS

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For more than 100 years, lead-based paint has been recognized as harmful to human health yet its use in residential properties persisted throughout much of the 20th century. Even today in the 21st century, lead-based paint continues to find its way into children's environments either as lead-containing dust or in lead-painted products that are manufactured and exported without strict controls.

The history of lead-poisoning prevention has been defined to some extent by the quality of the analytical methods available for lead measurements, whether in materials such as paints and plastics, in environmental samples such as water, soil and air, or in biological tissues and fluids. Today, lead poisoning is diagnosed by means of a blood lead test. The quality of blood lead methods has improved so much over the last three decades that we now know far more about the adverse health effects from low level lead exposure. In recognition of this, the U.S. CDC has periodically revised the blood lead threshold deemed harmful to children's health. However, in the last few years, new evidence has begun to emerge that suggest there may be no safe blood lead threshold for children.

Improvements in analytical techniques have also had an impact on environmental measurement quality. Yet many environmental thresholds have remained unchanged for decades. In the light of current understanding of the adverse health effects of low level lead exposure, the U.S. Federal government has legislated new thresholds for lead in children's products. One key question is, are current analytical techniques adequate to detect lead at the new lower threshold? Other questions that need to be addressed include the benefits of total lead measurement versus measurement of the lead that is bioavailable or extractable. There does not appear to be a clear consensus among experts.

XRF has always offered the advantage of being rapid and non-destructive compared to techniques such as AAS and ICP-MS. Today, new XRF technologies offer the promise of better detection limits. Collaborations between XRF manufactures and public health scientists will ensure that new instruments and applications will be developed to serve the needs of today's environmental health problems, whether it is lead, mercury, cadmium, or some other toxic metal. In this regard, the Wadsworth Center has been involved in improving the quality of lead measurements in collaboration with several federal agencies, including the CDC and NIST (Development of NIST SRM 955c Lead in Caprine Blood), with the NIEHS (Bone Lead Standardization Program). The Wadsworth Center has also been involved with several ongoing NIH-funded collaborations with scientists from X-Ray Optical Systems (XOS), the Albany Medical College, and the Albany Stratton VA Hospital.