LEAD POISONING EFFECTS ON PREGNANT WOMEN AND CHILDREN

by

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DISCLOSURE

I have no financial interest, arrangement or affiliation that would constitute a conflict of interest

Objectives

- Introduction
- Adverse Health Effects of Lead Exposure in Pregnancy
- Distribution of BLLs, Risk Factors For and Sources of Lead Exposure in Pregnant and Lactating Women
- Blood Lead Testing in Pregnancy and Early Infancy
- Management of Pregnant and Lactating Women Exposed to Lead
- Nutrition and Lead in Pregnancy and Lactation
- Chelation of Pregnant Women, Fetuses, and Newborn Infants
- Breastfeeding
- Health Education Recommendations
- Lead – Health Concerns for Children

Introduction

- **600 000** new cases of children with intellectual disabilities every year
- 99% of children affected by high exposure to lead live in low- and middle-income countries, says WHO
- **143 000 deaths** per year result from lead poisoning
- At high levels of exposure, lead damages the brain and central nervous system to cause coma, convulsions and even death. Children who survive such poisoning are often left with intellectual impairment and behavioural disorders
- At lower levels of exposure, lead is now known to produce a spectrum of injury across multiple body systems. In particular, lead affects brain development in children, resulting in reduced IQ, behavioural changes such as shortening of attention span and increased antisocial behaviour, and reduced educational attainment. These effects are believed to be irreversible. Adults are at increased risk of kidney disease and raised blood pressure.

Metabolism of Lead

- The main route of absorption in adults is the respiratory tract where 30–70% of inhaled lead finds its way into the circulation
- Gastrointestinal absorption in adults is generally less complete and averages approximately 10% of the ingested load
- In children, alimentary absorption is about 50% and, together with their greater volume of air inhaled in relation to body size, total lead absorption from the environment is around three times higher than for adults
- Iron deficiency and low dietary calcium promote lead absorption.

Metabolism of Lead (contd..)

- The blood pool contains the rapidly exchangeable component but accounts for only 2% of the total body burden (95% bound to the erythrocyte membrane & hemoglobin & 5% in the plasma)
- The remainder of the total body burden is distributed between an intermediate pool comprising skin and muscle, and a stable pool in dentine and the skeleton
- Lead is eliminated mainly in the urine.

ADVERSE HEALTH EFFECTS OF LEAD EXPOSURE IN PREGNANCY

IMPACT OF LEAD EXPOSURE ON SEXUAL MATURATION AND FERTILITY

- Selevan et al. (2003) analyzed blood lead and pubertal development by race in girls ages 8-18 years of age.

Blood lead levels as low as 3 µg/dL were associated with 2 to 6 month delays in Tanner stage measurements (breast and pubic-hair development) and menarche in African-American and Mexican-American girls, while Non-Hispanic white girls experienced non-statistically significant delays in all pubertal measures.

IMPACT OF LEAD EXPOSURE ON MATERNAL HYPERTENSION DURING PREGNANCY

- **Gestational Hypertension**

Among 3,851 women delivering at a Boston Hospital from 1979-1981, incidence of pregnancy hypertension and elevated blood pressure at delivery increased significantly as blood lead increased (mean blood lead 6.9 ± 3.3 µg/dL). During delivery, lead levels correlated with both systolic (Pearson r = 0.081, p = 0.0001) and diastolic (r = 0.051, p = 0.002) blood pressure. Using a reference level of 0.7 µg/dL, the relative risk doubled when blood lead level approached 15.

IMPACT OF LEAD EXPOSURE ON MATERNAL HYPERTENSION DURING PREGNANCY

- **Preeclampsia**

Preeclampsia is usually associated with edema, hyperuricemia, and a fall in glomerular filtration rate. Blood lead levels have been associated with the risk for preeclampsia.

Dawson et al. (2000) observed significant differences between normotensive (N = 20) and hypertensive or preeclamptic (N = 19) pregnancies with respect to red blood cell lead content. They found maternal blood pressure to be directly proportional to RBC lead content.

IMPACT OF LEAD EXPOSURE ON PREGNANCY OUTCOMES

- **Spontaneous Abortion**

The strongest evidence to date is a prospective study of pregnant women in Mexico City, which demonstrated a statistically significant dose-response relationship between maternal blood lead levels (average 11.0 µg/dL) and risk for spontaneous abortion (Borja- Aburto et al. 1999). Odds ratios for spontaneous abortion for the blood lead groups 5-9, 10-14, and >15 µg/ dL were 2.3, 5.4, and 12.2, respectively, in comparison to the reference group (<5 µg/dL) (p for trend = 0.03) with an estimated increased odds for spontaneous abortion of 1.8 (95% CI = 1.1–3.1) for every 5 µg/dL increase in blood lead.

Women with a larger plasma-to-whole blood lead ratio may be at higher risk for miscarriage due to a greater availability of lead in plasma, which more readily crosses the placental barrier.

IMPACT OF LEAD EXPOSURE ON PREGNANCY OUTCOMES

- **Preterm Delivery, Low Birth Weight, Length, and Head Circumference**

A case-control study in Mexico City found cord blood lead to be higher in preterm infants (mean 9.8 µg/dL) compared to term infants (mean 8.4 µg/dL) (Torres-Sanchez et al. 1999).

A birth cohort study, also conducted in Mexico City, found maternal bone lead burden to be inversely related to birth weight (Gonzalez-Cossio et al. 1997) and birth length and head circumference at birth (Hernandez-Avila et al. 2002).

IMPACT OF LEAD EXPOSURE ON PREGNANCY OUTCOMES

- **Congenital Anomalies**

In a case-control study, Bound et al. (1997) found an increased risk between living in an area with water lead levels greater than 10 µg/L (ppb) and delivering a child with a neural tube defect.

Irgens et al. (1998) found, in a registry-based study, women occupationally exposed to lead were more likely to deliver an infant with a neural tube defect than women not exposed to lead (OR = 2.87, 95% CI = 1.1–6.4).

IMPACT OF LEAD EXPOSURE ON INFANT GROWTH AND NEURODEVELOPMENT

- **Infant Growth**

In a study, postnatal linear growth rate was negatively related to prenatal blood lead level, although only when infants' postnatal lead exposure was elevated (Shukla et al. 1989). Infants born to a mother with prenatal blood lead concentration greater than 7.7 µg/dL (the median level in the cohort) and whose blood lead increased 10 µg/dL between 3 and 15 months of age were about 2 cm shorter at 15 months of age ($p = 0.01$).

IMPACT OF LEAD EXPOSURE ON INFANT GROWTH AND NEURODEVELOPMENT

- **Lead and Neurodevelopment**

Lead is known to interfere with synaptogenesis (Goldstein 1992). It interferes with stimulated neurotransmitter release at synapses in the cholinergic, dopaminergic, noradrenergic, and GABergic systems (Cory-Slechta 1997; Guilarte et al. 1994). It substitutes for calcium and zinc as a second messenger in ion-dependent events. These disturbances in neurotransmitter release would thus be expected to disrupt the normal organization of synaptic connections (Bressler and Goldstein 1991).

DISTRIBUTION OF BLLS, RISK FACTORS FOR AND SOURCES OF LEAD EXPOSURE IN PREGNANT AND LACTATING WOMEN

Pica

Although formal pica definitions vary, the behavior common to all definitions of pica is a pattern of deliberate ingestion of nonfood items. Some definitions focus solely on the eating behavior (e.g., Medline defines pica as “a pattern of eating non-food materials (such as dirt or paper)” (Medline Plus 2009).

Materials ingested as pica can be benign or potentially harmful and include ice, paper, dirt, clay, starch, ashes, and small stones as well as substances contaminated with lead or other toxic substances such as lead pencils, supari, chalia, gutka, cigarette, sheesha. Pica behavior has been associated with anemia and other nutritional deficiencies.

Dietary and Lifestyle Factors

Nutritional status may make women more susceptible to lead exposures. Adequate dietary intake of certain key nutrients (calcium; iron; zinc; vitamins C, D, and E) is known to decrease lead absorption (Mahaffey 1990). Iron deficiency anemia is associated with elevated blood lead levels and may increase lead absorption and also has an additional independent negative impact on fetal development. Calcium deficiency may increase bone turnover since maternal bone is a major source of calcium for the developing fetus and nursing infant. *Both* ***sheesha use*** and ***cigarette smoking*** *have also been associated with higher lead levels.*

SOURCES OF LEAD EXPOSURE

- Occupational sources
- Lead-glazed Ceramic Pottery
- Cosmetics (kaajal, surma, mascara, lipstick, etc.)
- Foods & other consumer products (lunch boxes, candy wrappers, lollipop sticks, plastic crockery)
- Lead in jewelry
- Lead in drinking water (drinking utensils)
- Lead Paint
- Lead-contaminated Soil
- Hobbies and Recreational Activities

Lead-glazed Ceramic Pottery

Lead in jewelry

BLOOD LEAD TESTING IN PREGNANCY AND EARLY INFANCY

Clinical Indicators for Blood Lead Testing

Symptoms or physical findings of lead poisoning are present, they are often difficult to differentiate as they are generally nonspecific and quite common. These include:

- constipation,
- abdominal pain,
- anemia,
- headache,
- fatigue,
- myalgias and arthralgias,
- anorexia,
- sleep disturbance,
- difficulty concentrating,
- and hypertension, among others.

What Tests Can Assist with Diagnosis of Lead Toxicity?

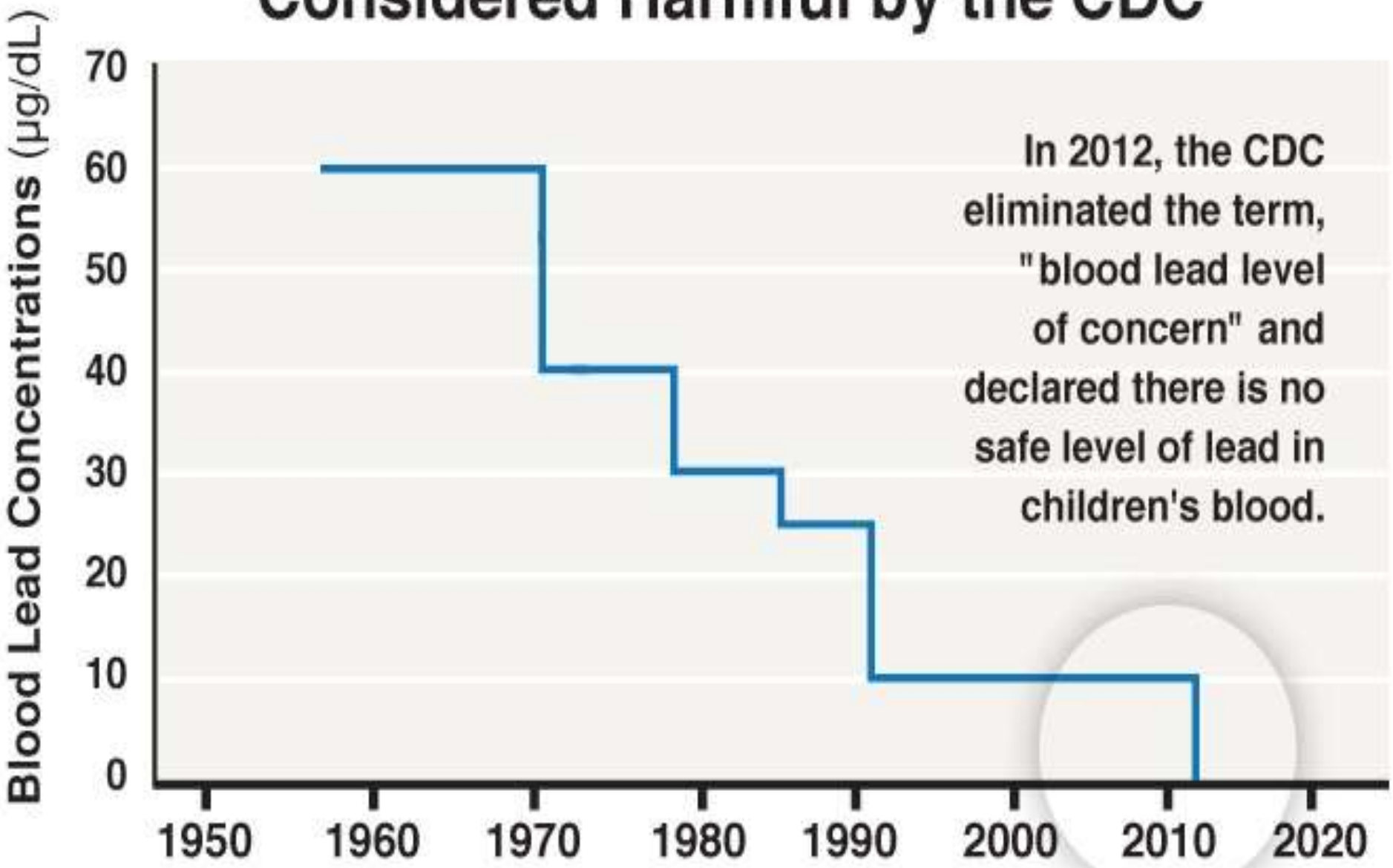
- Venous BLL testing is the most useful screening and diagnostic test for recent or ongoing lead exposure as opposed to past exposures
- Given the greater risk of contamination using the finger-stick method, an elevated BLL obtained through finger-sticking should always be confirmed through veinpuncture. (AAP 1993 and CDC, 1997a)
- BLLs respond relatively rapidly to abrupt or intermittent changes in lead intake (for example, ingestion of lead paint chips by children) and, for relatively short exposure periods, bear a linear relationship to those intake levels
- For individuals with high or chronic past exposure, however, BLLs often under-represent the total body burden because most lead is stored in the bone and may have “normal” levels in the blood.

The Toxic Threshold

"Conclusions: Blood lead concentrations, even those below 10 µg/dL, are inversely associated with children's IQ scores at three and five years of age, and associated declines in IQ are greater at these concentrations than at higher concentrations. These findings suggest that more children may be adversely affected by environmental lead than previously estimated."

Canfield et al. 2003, NEJM, 384

Blood Lead Concentrations Considered Harmful by the CDC



Risk Assessment Questions for Pregnant Women

The following questions are suggested to determine if a pregnant woman is at risk for current high dose exposure to lead.

- Do you or others in your household have an occupation that involves lead exposure?
- Sometimes, pregnant women have the urge to eat things other than food, such as clay, soil, plaster or paint chips. Do you ever eat paint chips?
- Do you live in an old house with ongoing renovations that generate a lot of dust (e.g., sanding and scraping)?
- To your knowledge, has your home been tested for lead in the water and, if so, were you told that the level was high?
- Do you use any traditional folk remedies or cosmetics that are not sold in a regular drug store or are homemade, which may contain lead?
- Do you or others in your household have any hobbies or activities likely to cause lead exposure?
- Do you use non-commercially prepared pottery or leaded crystal or jewelry?

MANAGEMENT OF PREGNANT AND LACTATING WOMEN EXPOSED TO LEAD

Medical Management of Pregnant & Lactating Women With BLL ≥5 µg/dL

- Attempt to determine source(s) of lead exposure and counsel patients on avoiding further exposure, including identification and assessment of pica behavior
- Assess nutritional adequacy and counsel on eating a balanced diet with adequate intakes of iron and calcium
- Perform confirmatory and follow-up blood lead testing according to the recommended schedules
- For occupationally exposed women, review the proper use of personal protective equipment
- Encourage breastfeeding.

Current CDC Policy

Blood lead level µg/dL)[b]	Actions	Time frame for beginning intervention
10-14	Provide caregiver lead education. Provide follow-up testing. Refer the child for social services if necessary.	Within 30 days
15-19	Above actions, plus: If BLLs persist (i.e., 2 venous BLLs in this range at least 3 months apart) or increase, proceed according to actions for BLLs 20-44.	Within 2 weeks
20-44	Above actions, plus: Provide coordination of care (case management). Provide clinical evaluation and care.[c] Provide environmental investigation and control current lead hazards.	Within 1 week
45-70	Above actions.	Within 48 hours
70 or higher	Above actions, plus hospitalize child for chelation therapy immediately.	Within 24 hours

Proposed CDC Policy

Blood lead level (µg/dL)	Actions	Time frame for beginning intervention
<2	No action	
2-5	Provide caregiver lead education. Provide follow-up testing. Refer the child for social services to investigate possible sources of lead exposure.	Within 30 days
5-10	Above actions, plus:If BLLs persist (i.e., 2 venous BLLs in this range at least 3 months apart) or increase, proceed according to actions for BLLs 10-20.	Within 2 weeks
10-20	Above actions, plus: Provide coordination of care (case management). Provide clinical evaluation and care. Provide environmental investigation and control current lead hazards.	Within 1 week
20-70	Above actions.	Within 24 hours
70 or higher	Above actions, plus hospitalize child for chelation therapy immediately.	Within 24 hours

NUTRITION AND LEAD IN PREGNANCY AND LACTATION

General Nutritional Recommendations for Pregnant and Lactating Women

- All pregnant and lactating women should eat a balanced diet in order to maintain adequate amounts of vitamins, nutrients, and minerals
- All pregnant and lactating women should be evaluated for iron status and be provided with supplementation in order to correct iron deficiency
- All pregnant and lactating women should be evaluated for the adequacy of their diets and be provided with appropriate nutritional advice and prenatal vitamins
- Women in need of assistance should be referred to programs, such as the Supplemental Nutrition Assistance Program
- All pregnant and lactating women should avoid the substances that may adversely affect the developing fetus or infant.

Recommendations for Pregnant and Lactating Women with BLL ≥5 µg/dL

- In pregnant and lactating women with BLLs ≥5 µg/dL or with a history of lead exposure, a dietary calcium intake of 2,000 milligrams daily should be maintained, either through diet or in combination with supplementation.

Association of Dietary Iron Intake and Iron Status with Lead Levels

- Both low iron status and elevated lead exposure impair hematopoiesis and intellectual development during gestation and infancy (Black et al. 2008).
- Exposure to lead and reduced iron status result in greater impairment than the lead-associated impairment in heme biosynthesis alone (Kwong et al. 2004; Mahaffey-Six and Goyer 1973).

CHELATION OF PREGNANT WOMEN, FETUSES, AND NEWBORN INFANTS

OVERVIEW OF CHELATION

Chelation therapy utilizes the chemical characteristics of a chelating agent to remove lead from participation in biological reactions in the body, by binding the agent with the metal (lead) to form a chelate. A chelate is defined as a *complex formation involving a metal ion and two or more polar groupings of a single molecule* (Stedman's 2008).

Notice that this definition does not indicate the fate of the chelated metal. Possibilities include excretion of the chelate, persistence in the tissue where the bonding occurred, or redistribution to other tissues. Ideally, the drug should effectively increase lead excretion, be easily administered, be affordable, and be safe (Markowitz 2000).

Key Recommendations for Chelation Therapy

- Chelation therapy should be considered for pregnant women with confirmed BLLs ≥45 µg/dL on a case-by-case basis, in consultation with an expert in lead poisoning
- Pregnant women with confirmed BLLs ≥45 µg/dL should be considered as having high-risk pregnancies and managed in consultation with an expert in high-risk pregnancy
- Infants (0-6 months of age) with a confirmed BLL of ≥45 µg/dL should be considered as candidates for chelation in consultation with an expert in pediatric lead chelation therapy
- Before considering chelation therapy for a pregnant woman (or infant), blood lead levels should be repeated and confirmed using an additional venous blood lead sample collected within 24 hours
- Chelation therapy must occur in a lead-safe environment; therefore, prior to initiating chelation therapy, the patient should be removed from further lead exposure.

BREASTFEEDING

THE IMPORTANCE OF BREASTFEEDING

- With regard to short-term risks, lack of breastfeeding is associated with increases in common childhood infections, such as diarrhea (Chien and Howie 2001) and ear infections (Ip et al. 2007), with potentially serious complications such as meningitis, dehydration, and hearing impairment
- Lack of breastfeeding also increases the risk for some relatively rare but severe infections and diseases, such as severe lower respiratory infections (Bachrach et al. 2003; Ip et al. 2007), leukemia (Ip et al. 2007; Kwan et al. 2004), and—especially important for preterm infants—necrotizing enterocolitis (Ip et al. 2007)
- The risk of hospitalization for lower respiratory tract disease in the first year of life is more than 250% higher among babies who are formula fed compared with those who were exclusively breastfed at least 4 months (Bachrach et al. 2003)
- Furthermore, the risk for Sudden Infant Death Syndrome is 56% higher among formula-fed versus breastfed infants (Ip et al. 2007).

THE IMPORTANCE OF BREASTFEEDING (contd..)

- Women who breastfeed experience less postpartum bleeding, earlier return to prepregnancy weight and a reduced risk for ovarian cancer and premenopausal breast cancer (U.S. Department of Health and Human Services 2000).

Key Recommendations for Initiation of Breastfeeding

- Measurement of levels of lead in breast milk is not recommended
- Mothers with BLLs <40 µg/dL should breastfeed
- Mothers with confirmed BLLs ≥40 µg/dL should begin breastfeeding when their blood lead levels drop below 40 µg/dL. Until then, they should pump and discard their breast milk
- These recommendations are not appropriate in countries where infant mortality from infectious diseases is high (World Health Organization Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality 2000).

Key Recommendations for Continuation of Breastfeeding

- Breastfeeding should continue for all infants with BLLs below 5 µg/dL
- Infants born to mothers with BLL ≥5 µg/dL can continue to breastfeed unless there are indications that the breast milk is contributing to elevating BLLs. These infants should have blood lead tests at birth
- For infants whose blood lead levels are rising or failing to decline by 5 µg/dL or more, environmental and other sources of lead exposure should be evaluated. If no external source is identified, and maternal BLLs are >20 µg/dL and infant BLL ≥5 µg/dL, then breast milk should be suspected as the source, and temporary interruption of breastfeeding until maternal blood lead levels decline should be considered.

Key Recommendations for Use of Reconstituted Infant Formula

- Infant formula requiring reconstitution should be made only with water from the cold water tap. Flush the tap for at least 3 minutes before use and then heat the water or use bottled or filtered tap water known to be free of lead.

HEALTH EDUCATION RECOMMENDATIONS

HEALTH EDUCATION NEEDS

- Continuing Medical Education (CME) on Lead and Pregnancy
- Environmental Health Requirement in Basic Practitioner's Curriculum
- Preconceptional Counseling on Lead Exposure for Adults of Childbearing Age
- Expand Resources for National Centralized Data Collection and Management Facility
- Evaluate the Effectiveness of Currently Available Personal Protective Equipment.

LEAD – HEALTH CONCERNS FOR CHILDREN

Lead – Health Concerns for Children

Young children are at a greater risk of lead poisoning for several reasons. First, they often put their hands and other objects in their mouths – these objects may have lead dust on them. If they live or go to school in a place with high levels of lead, in the paint or dust, their bodies can easily absorb the lead. Children sometimes eat lead-based paint because it can have a sweet taste.

A child's body reacts differently to lead, as compared to an adult's body. Lead substitutes for calcium; young bodies need calcium, so children can absorb 70% of the lead they ingest, while adults only absorb 20%. Children can also absorb more lead through their stomach than adults, especially if they are deficient in iron. Finally, because childrens' brains and nervous systems are still developing, they are more sensitive to the neurotoxic effects of lead than adults.

Lead exposure

About 310,000 U.S. children ages 1 to 5 have elevated blood lead levels, which can accumulate over months and years and cause serious health problems.

Effects on children

- Kids absorb up to 70 percent of lead, adults about 20 percent
- Often undetected; no obvious symptoms
- Can lead to learning disabilities, behavioral problems, malformed bones, slow growth
- Very high levels can cause seizures, coma, death

Sources

- Lead-based paint, contaminated dust in homes built before 1978
- Drinking water from lead pipes
- Contaminated food
- Soil (lead does not biodegrade, decay)
- Toys*

What parents can do

- Have child screened if there is concern of lead exposure
- Frequently wash child's hands, toys, pacifiers
- Only use cold tap water for drinking, cooking
- Test paint, dust in home if it was built before 1978

*Old toys with lead paint a known risk, but new toys from China now have come under scrutiny

Source: U.S. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services

Checklist of Possible Neuropsychological Problems Associated with Lead

- Delayed language or motor milestones (infant, toddler)
- Poor speech articulation
- Poor language understanding or usage
- Problems maintaining attention in school or home
- High activity level (hyperactivity)
- Problems with learning and remembering new information
- Rigid, inflexible problem-solving abilities
- Delayed general intellectual abilities
- Learning problems in school (reading, language, math, writing)
- Problems controlling behavior (e.g., aggressive, impulsive)
- Problems with fine or gross motor coordination.

Real-World Outcomes of Lead Poisoning in Children

Poor Academic Learning and Performance:

- Learning Disabilities
- Problems Paying Attention
- Disorganized Approach to Learning
- Poor Work Completion
- Increased Risk to Drop Out.

Real-World Outcomes of Lead Poisoning in Children (contd..)

Poor Social Relationships:

- Communication Deficits
- Impulsive, Hyperactive Behavior
- Problems Sharing and Taking Turns
- Increased Aggression
- Increased Need for Adult Supervision.

Childhood Lead Poisoning

- Learning Disabilities
- Speech Disorders
- Lower IQ
- Behavioral Disorders
- Health Problems
- Hyperactivity

Effects to Child's Future

- Life-long Health Problems
- Academic Failure
- Employment Difficulties
- Socialization Problems
- Criminal Record

Effects to Society

- Expensive Healthcare
- Unemployment
- Juvenile Justice
- Special Education

A Study on the Effect of Baby Walker on Mean Age Acquisition of Motor Skills in Infants

The mean age of acquisition of all motor skills including rolling, crawling, moving of hands and feet, sitting with and without help, standing and walking dependently and independently was delayed in infants using baby walkers.

The results have shown negative results and recommend to increase awareness among the parents and authorities. (Pak J Neurol Sci 2009, 4(2):65-67)

Reducing Childhood Exposure to Lead

- Frequently wash hands, especially after coming inside, and before eating. Remove shoes when coming inside. Vacuum often. Clean floors, window frames, and window sills weekly. Use a mop, sponge or paper towel with warm water and a general all-purpose cleaner
- Children are exposed to lead by eating old paint chips or ingesting old paint particles and dust. Projects that disturb lead-based paint can create dust and endanger you and your family
- Cold water is much less likely to leach lead from the pipes. Use only cold water for drinking, cooking, and making baby formula. If water has been sitting in the pipes for 6 hours or more, flush cooking and drinking outlets before using the water

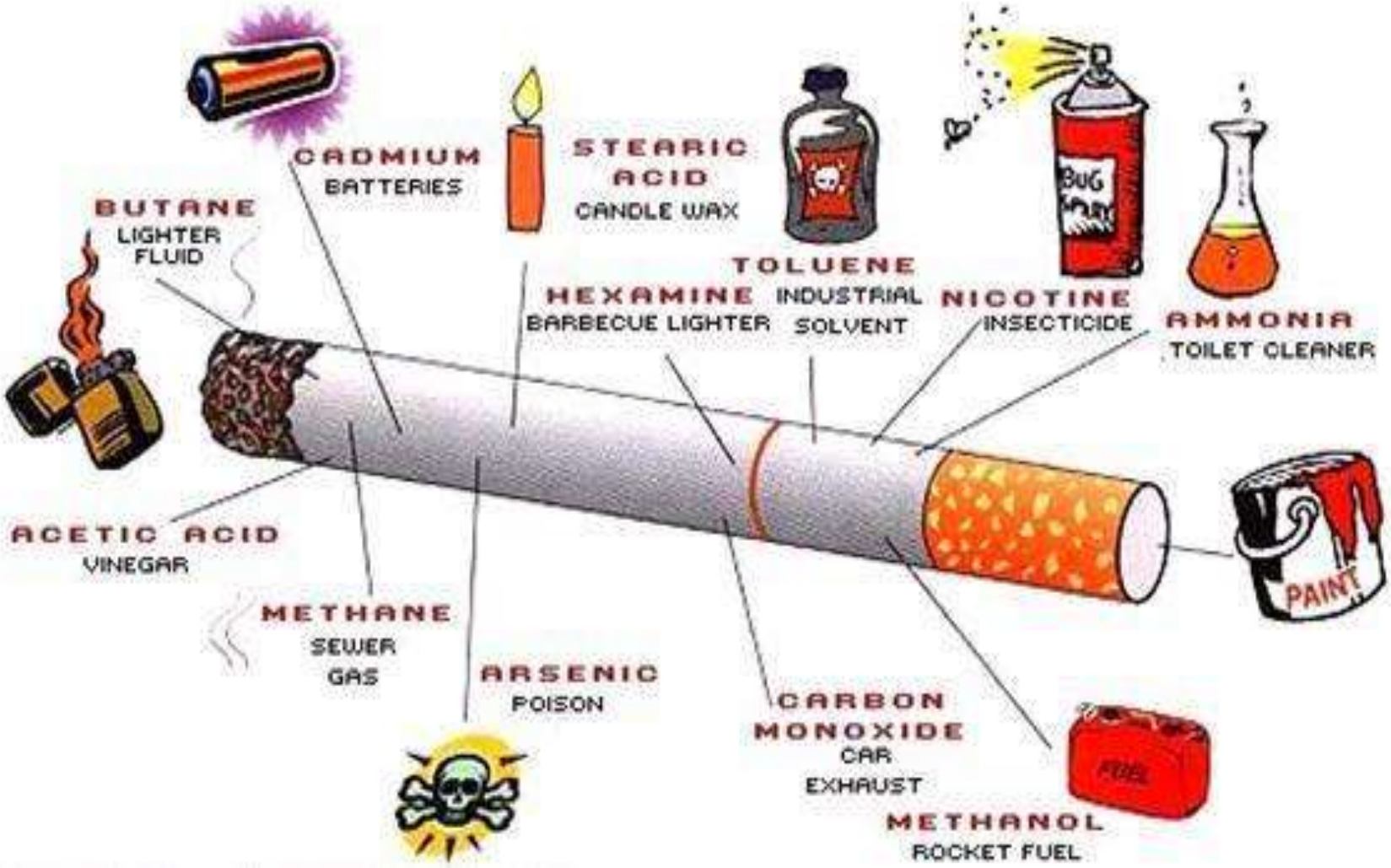
Reducing Childhood Exposure to Lead (contd..)

- Avoid (imported, old, or handmade pottery) these types of pottery when eating, drinking and cooking
- Soil is often contaminated with lead, especially the soil around old homes and alongside major roadways. Use a rough mat for wiping feet or go shoe-free inside where allowable. Frequently damp mop
- Avoid imported painted toys (especially those with bright red paint) and children's vinyl products
- Some non-traditional medicines (folk remedies) can contain dangerously high levels of lead
- Keep metal jewelry away from children
- Keep candy away from children
- Regularly wash childrens' hands, toys, and pacifiers
- Avoid nutrient deficiencies by eating a balanced diet high in calcium (e.g. milk, cheese, yogurt) & iron (e.g. chicken, spinach).

Tobacco

- Blood lead levels in children have been associated with exposure to environmental tobacco smoke.
- Maternal smoking during pregnancy has been associated with behavioral problems and impaired cognitive development in children; fetal hypoxia is one possible contributing mechanism (Habek et al. 2000).

Cigarette component



Adult Smoking

Focusing on People with Mental Illness*

1 in 3 

More than 1 in 3 adults (36%) with a mental illness smoke cigarettes, compared with about 1 in 5 adults (21%) with no mental illness.

 3 in 10

About 3 of every 10 cigarettes (31%) smoked by adults are smoked by adults with mental illness.

1 in 5 

Nearly 1 in 5 adults (or 45.7 million adults) have some form of mental illness.

*Mental illness is defined as a diagnosable mental, behavioral, or emotional disorder, other than a developmental or substance abuse disorder.

Source: CDC Vital Signs, February 2013 | www.cdc.gov/vitalsigns

The Health Benefits of Quitting

After...

20 minutes	...Blood pressure drops to near the level before you had your last cigarette.
8 hours	...Carbon monoxide level in the blood drops to normal.
24 hours	...Chance of heart attack decreases.
2 weeks to 3 months	...Circulation improves. Lung function increases up to 30%.
1 year	...Chance of heart attack is cut in half.
5 years	...Stroke risk is reduced to levels of a non-smoker's.
10 years	...Risk of dying from lung cancer is about half of a current smoker.

Bisphenol A (BPA)

Scientific studies have shown that, being exposed to very low doses of BPA (Bisphenol A) during early development were linked with:

- breast and prostate cancer
- heart disease
- diabetes
- obesity
- decline in sperm counts
- abnormal penile/urethra development in males
- early sexual maturation in females
- increasing neurobehavioral problems
- and immune system effects in later life.

How to avoid BPA

Bisphenol A (BPA), a chemical found in plastics used to package food, may be linked to birth defects, reproductive problems, heart disease.

What to look for

- Container bottoms marked with 7* or 3 may contain PBA

*New bio-based or combination plastics also marked with numeral 7

Potentially harmful

- Mimics the hormone estrogen
- Found in the urine of 93 percent of the population over age 6; suggests constant exposure to BPA
- BPA can leach into food or beverage if plastic container is heated

Products, purpose of BPA		**Safer alternatives**
Baby bottles Makes bottle transparent		• Use glass bottles or plastic bag inserts • BPA-free bottles available
Nondisposable water bottles Makes bottle shatterproof		• Do not wash in dishwasher • Use stainless steel or BPA-free plastic bottles
Canned food lining Prevents corrosion, food contamination		• Choose food packaged in cardboard cartons • Eat fresh produce
Dental sealant, composite Resin contains BPA-based materials		• Amalgam filling; contains 50 percent mercury • Consult dentist to limit risk

- **BPA also found in** plastic eyeglass lenses, coatings on cash register receipts, CDs, paints, medical equipment, toys

Source: AP, Green Guide, BPA Global Group, U.S. Centers for Disease Control and Prevention, American Dental Association

Graphic: Melina Yingling


BABY BOTTLE
BPA
POTENTIAL HEALTH EFFECTS:
BEHAVIORAL CHANGES, PREDISPOSITION TO PROSTATE AND BREAST CANCER, EARLY PUBERTY


contain
BPA

What Can Be Done?

Prevention:

- Lead-safe Housing
- Education of Public, Medical and Educational Communities.

Intervention:

- Universal Early Identification
- Lead-safe Housing
- Aggressive Early Medical Treatment
- Aggressive Early Behavioral Treatment
- Rehabilitation and Special Education Services
- Adequate Nutrition.


Thank you!