# periFACTS<sup>®</sup> OB/GYN Academy Obstetric and Fetal Monitoring Course Case #1108

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About the Program

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10,688 individual participants at 443 sites use the periFACTS® OB/ GYN Academy. 159 nursing schools use periFACTS®'s Introduction to Fetal Heart Rate Monitoring Tutorial for student teaching.

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#### <u>Minimum System Software Requirements</u> PC

Microsoft Windows 2000 or later Internet Explorer (version 6.0 or later) or Mozilla Firefox (2.0 or later) or Safari (3.0 or later) web browser Google Andriod Browser (1.6 or higher) FlashPlayer (5.0 or la

### **Obstetric and Fetal Monitoring Course**

Learning Objectives for **periFACTS**<sup>®</sup> Cases #1108 and #1109: In addition to the overarching Obstetric and Fetal Monitoring Course objectives, upon completion, the learner also will be able to:

State the 2012 CDC reference blood lead level. List health impacts of perinatal exposure to lead. Summarize key messages to share with pregnant women about lead poisoning prevention. Interpret B.C.'s fetal heart rate tracing.

### INTRODUCTION

Lead serves no useful purpose in the human body, but its presence can lead to toxic effects, regardless of exposure pathway. Until the mid to late 1970s, lead was commonly used in house paint and as an "anti-kno22nitorindramaticaln Le.-001 9.56 71820-1 66

ages one and five in the U.S. with blood lead levels (BLL) greater than or equal to 10  $\mu$ g/dL dropped from about 890,000 children to about 310,000 (ATSDR, 2007a). In 2012, the Centers for Disease Control and Prevention (CDC) estimated there still were 535,000 children with BLL over the new CDC reference value of 5  $\mu$ g/dL (CDC, 2013). It should be noted that no organization, including the CDC, has established a "safe" low blood level, especially since lead accumulates in the body over time. Lead continues to affect many communities, especially low-income children living in older housing, at disturbingly high rates. Globally, the World Health Organization (WHO) has declared that the benefit of preventing childhood lead exposure is equal to or greater than that of vaccination for other diseases (WHO, 2010).

Thus, despite progress, elevated BLLs (EBLL) are still a significant health problem in the U.S. Additional sources of lead poisoning, such as imported or contaminated products, continue to be discovered each year. New research also shows that lead is more dangerous, both at lower levels and in more ways, than previously was understood. These recent findings have significant implications for women's healthcare providers. This article briefly reviews the current understanding of lead sources, exposure risks, and health impacts. It also highlights new findings that are particularly significant for perinatal care and reviews new clinical guidelines and counseling for addressing lead exposure during pregnancy.

# LEAD 101

There are many excellent lead exposure and poisoning prevention materials for providers and patients, particularly related to protecting young children. Several national resources are listed in Figure 1; others may be available from local or state health departments that highlight particular issues of local concern and relevant policies, resources, and programs. A brief overview of the sources, effects, and guidelines for preventing lead poisoning is provided below.

# Sources and Exposures

Lead is a naturally occurring metal that has been mined by humans for thousands of years and has been used in a wide range of products, resulting in its distribution throughout the environment. Before 1978, when lead was removed from residential paint, the main sources of lead poisoning were paint, house dust, contaminated soil, water, and some consumer products. House dust is the main route of exposure for most children today.

Adults who work with lead through a hobby or occupation (e.g., stained glass, target shooting, hunting, fishing, or soldering) may be at risk for poisoning. Lead exposure is a leading cause of workplace illness (OSHA, 2012). Workers involved in mining and smelting, mechanics, metalwork, plumbing, and construction (especially housing renovation, painting, and remodeling) are at particular risk of exposure.

Figure 1: Lead Poisoning Prevention and General Information Sources

current or past exposures (e.g., from childhood exposure, consumer products, living in a country that still used leaded gasoline, or her occupation, all of which could result in elevated bone levels). Lead that is stored in a woman's bones or other tissues may be mobilized during pregnancy and lactation, re-entering her bloodstream where it can be transferred to the fetus through the placenta or to the infant through breast milk.

Prenatal exposure has lasting effects on the baby. As in young children, prenatal exposure can have a significant impact on neurodevelopment; effects have been shown across all trimesters (Hu, 2006, and Schnaas, 2006). Neurologic effects on the developing brain may result in symptoms such as attention deficit and hyperactivity (Plusquellec, 2007), lowered IQ (Schnaas, 2006), and a range of chronic illnesses later in life (Liua, 2013). Recent research in animals suggests that exposure combined with stress during pregnancy may have even greater effects on the baby than either one alone (Cory-Slechta, 2010; Cory Slechta, 2008; and Virgolini, 2006). These findings highlight the importance of addressing these issues during pregnancy, especially in women at risk of exposure to both high levels of stress and lead (Rossi-George, 2009; and Virgolini, 2008).

## Screening, Testing, and Counseling about Lead During Pregnancy

Alerting pregnant women to potential risks in their environment can help families reduce their baby's risk of exposure to high levels of lead during pregnancy or after birth. The American College of Obstetricians and Gynecologists (ACOG) and the CDC (Figure 1) both offer guidelines for counseling women about lead. The first step is to identify women who may be at risk, usually through screening questions about potential current or past exposures (Figure 2). Women who are or were potentially exposed are advised to get a blood test. If the mother's BLL is greater than or equal to 5 µg/dL, ACOG and CDC educational counseling. follow-up auidelines suggest testina. environmental/occupational investigations, or-for extremely high EBLLs of greater than or equal to 45 µg/dL—chelation. Unfortunately, there are no proven strategies for reducing exposure to the infant or fetus, although some studies in women with high BLL suggest that calcium supplementation may be helpful (Han, 2000, and Kosnett, 2007).

Counseling messages should be based on likely exposure sources. For example, refugees or recent immigrants may use traditional products known to contain lead and should be warned about these risks (NYSDOH, 2008). Mothers who may be exposed at work through such activities as glassmaking or soldering should talk to their employer about reducing exposure, wash hands frequently, and change clothes before returning home from work.

The most important message about lead for most pregnant women is reducing potential risks in the home. For women living in pre-1978 housing, an inspection or risk assessment from a private contractor or health department to identify sources and pathways of lead exposure is one option. If that cannot be done, it is safest to assume there is contaminated paint present in older homes. Because many families undertake renovations in preparation for a new baby, it is essential to make sure women are aware

of lead-safe renovation practices and, particularly, that they not increase their risk by doing renovation work themselves. The area being renovated should be tested before work begins to determine if lead paint or dust is present. A recent study found that 14% of investigations of children with elevated BLL in New York identified a source related to renovations (Franko, 2009). The 2012 USEPA Renovation, Repair and Painting (RRP) rule requires all contractors who work in pre-1978 homes to be trained, certified, and follow lead-safe practices (EPA, 2014b). It is especially important for pregnant women to avoid the property until renovation work and cleanup are complete.

### Figure 2: What is My Lead Risk?

A final message that should be communicat

exposures. A history of past exposures may identify women who should be screened for future health problems including hypertension or osteoporosis. Current exposures can be addressed through residential hazard control, education, behavioral changes, elimination of lead-laden consumer products, or changes in the work place or living environment. Interventions with pregnant women have the added benefit of reducing the baby's future risk. As scientific understanding of lead continues to grow, so does our appreciation for the importance of reducing lead exposure for lifelong health.

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