PREGNANCY AND BREAST FEEDING AND THEIR RELATIONSHIP TO SERUM PCDD, PCDF, AND PCB LEVELS FOR A COMMUNITY IN MICHIGAN, USA

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Introduction

The University of Michigan Dioxin Exposure Study (UMDES) was undertaken in response to concerns among the population of two Michigan counties (Midland and Saginaw Counties) that dioxin-like compounds, including polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs), from the Dow Chemical Company facilities in Midland have contaminated areas of the City of Midland and sediments in the Tittabawassee River flood plain.[1] As a result of the environmental contamination, there is concern that people's body burdens, or serum levels, of dioxin-like compounds may be elevated. The UMDES is an exposure study and was designed to answer the following questions:

- Are dioxin levels in serum increased among people who live in the Tittabawassee River flood plain compared to people who live elsewhere in Midland and Saginaw counties or elsewhere in the State of Michigan?
- What factors explain the variation in serum dioxin levels among the entire population?

Factors such as pregnancy and breast feeding have been shown to have an effect on the levels of dioxin-like compounds in serum samples.[2, 3, 4] This paper examines the relationship between levels of dioxin-like compounds in serum samples of the study population and factors related to pregnancy and breast feeding. It will answer the following questions about dioxin-like compounds in women's serum:

- Does pregnancy increase levels of dioxin-like compounds?
- Does giving birth to a child that is not breast fed reduce dioxin-like compounds?
- Does giving birth to a child that is breast fed eliminate more dioxin-like compounds?
- Is breast feeding a first-born child more important in reducing levels of dioxin-like compounds than breast feeding subsequent children?

Materials and Methods

The UMDES included a random sample of people from five populations in Michigan. The five populations included in the study were:

- Residents of Midland and Saginaw Counties who reside in the flood plain of the Tittabawassee River
- Residents of Midland, Saginaw, and Bay Counties who reside in census blocks adjacent to the flood plain of the Tittabawassee River
- Residents of Midland, Saginaw and Bay Counties who do not reside in the flood plain of the Tittabawassee River
- Residents of Midland, Saginaw and Bay Counties who reside in the plume of the former Dow Chemical plant incinerator

- Residents of Jackson and Calhoun Counties, Michigan

In order to be eligible participate in the UMDES, subjects had to be at least 18 years old and had to have lived in their residence for at least five years. In order to be eligible to participate in the serum sampling, subjects had to meet the age and residence criteria and be medically eligible to provide a serum sample as defined by the American Red Cross. Details of the sample design and respondent selection are reported elsewhere.[5]

Serum sample analyses were performed by Alta Analytical Laboratory, Inc. (El Dorado Hills, California, USA) for the World Health Organization designated 29 PCDD, PCDF, and PCB congeners[6] using internal modifications of US EPA methods 8290[7] and 1668.[8] Details of the serum sampling methods and analyses are reported elsewhere.[9] Pregnancy and breast feeding data were obtained from the UMDES questionnaire.[10]

Descriptive statistics for variables that describe events related to pregnancy and breast feeding were created for each of the five study populations. Marginal comparisons explored the levels of dioxin-like compounds in serum samples among women with pregnancies but no children, women with one child, and women with more than one child.

Linear regression models adjusted for survey sampling weights were fit to evaluate the effects of pregnancy and breast feeding on levels of dioxin-like compounds in serum and answer the four questions presented earlier for each of the five study population. Models were also fit to determine if the levels of dioxin-like compounds in the serum of women with children decreased with an increase in the length of time a mother breast fed her child(ren). Additionally, the interaction between the age of the mother at the first breast feeding episode and the length of the first breast feeding episode was explored to determine if there were differences in the levels of dioxin-like compounds in serum samples between older mothers and younger mothers for each month increase in breast feeding the first child. All statistical analyses were completed using *SAS 9.1*.[11]

Results and Discussion

Results and discussion of the findings will be available in August 2006.

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