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11/03/2009 12:19 PM

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Subject 11/03/2009 Letter To EPA Docket Center

AR226-3919

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November 3, 2009

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EPA Docket Center, MC 2822T
U.S. Environmental Protection Agency
EPA West, Room 3334
1301 Constitution Avenue, NW
Washington, D.C. 20004

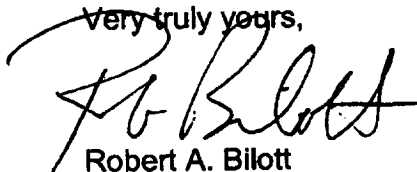
Re: Submission to IRIS and AR-226 Database For PFOA/PFOS: EPA-HQ-
ORD-2003-0016

To IRIS Database for PFOA/PFOS:

In response to the Notice issued by USEPA on February 23, 2006, regarding USEPA's efforts to consider perfluorooctanoic acid ("PFOA") and perfluorooctane sulfonate ("PFOS") within the Integrated Risk Information System ("IRIS"), 71 Fed. Reg. 9333-9336 (Feb. 23, 2006), we are submitting the following additional information to USEPA for inclusion in that review, and for inclusion in the AR-226 database:

1. Hoffman, K., et al., "Exposure to Polyfluoroalkyl Chemicals and Attention Deficit Hyperactivity Disorder in U.S. Children Aged 12-15 Years," 20 (6) *Epidem.* S70 (Nov. 2009) (ISEE 2009 Conference Abstract/Poster (Aug. 25-29, 2009)); and
2. Pinney, S.M., et al., "Perfluorooctanoic Acid (PFOA) and Pubertal Maturation in Young Girls," 20 (6) *Epidem.* S80 (Nov. 2009) (ISEE 2009 Conference Abstract/Poster (Aug. 25-29, 2009)).

Very truly yours,



Robert A. Bilott

RAB:mdm
Enclosures

November 3, 2009
Page 2

cc: Gloria Post (NJDEP)(w/ encl.) (via U.S. Mail)
Helen Goeden (MDH)(w/ encl.) (via U.S. Mail)
Lora Werner (ATSDR)(w/ encl.) (via U.S. Mail)

Epidemiology:

November 2009 - Volume 20 - Issue 6 - p S70

doi: 10.1097/01.ede.0000362918.40325.e9

Abstracts: ISEE 21st Annual Conference, Dublin, Ireland, August 25-29, 2009: Poster Presentations

Exposure to Polyfluoroalkyl Chemicals and Attention Deficit Hyperactivity Disorder in U.S. Children Aged 12-15 Years

Hoffman, Kate; Vieira, Veronica; Webster, Thomas; White, Roberta



Abstract

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OS2.2.5**Exposure to polyfluoroalkyl chemicals and attention deficit hyperactivity disorder in U.S. children aged 12-15 years.**

Kate Hoffman, Veronica Vieira, Thomas Webster, Roberta White
Department of Environmental Health, Boston University School of Public Health, United States

Background and Objective: Polyfluoroalkyl chemicals (PFCs) have been widely used in consumer products. Exposures in the U.S. and world populations are widespread. Associations between exposures to four common PFCs and parental report of diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) were evaluated.

Methods: Data were obtained from the National Health and Nutrition Examination Survey (NHANES) 1999-2000 and 2003-2004 for children aged 12-15. Parental report of a previous diagnosis by a doctor or healthcare professional of ADHD in the child was the outcome measure. PFOA, PFOS, PFNA, and PFHS levels were measured in serum samples from each child. The association between each PFC and ADHD was examined using smoothing, categories, and linear models. All analyses were adjusted for age, sex, race, maternal smoking during pregnancy, and environmental tobacco smoke. Confounding by variables such as lead and socioeconomic status was also assessed but associations were not altered.

Results: Of the 586 children aged 12 to 15 in the sample, 51 were reported by their parents to have been diagnosed with ADHD. When PFOS was entered into analyses as a continuous predictor, a 1.22 fold increased odds was observed for each 10 $\mu\text{g/L}$ increase (95% CI 1.03-1.45). Similarly, compared to the first quartile of PFOS exposure, individuals in the fourth quartile were 1.92 times more likely to have ADHD (95% CI 0.82-4.51; p-value for trend=0.039). There were also significant dose response relationships between PFHS and PFOA exposures and ADHD. For each $\mu\text{g/L}$ increase, the odds of ADHD increased 1.06 and 1.09 times respectively (95% CI 1.02-1.11 and 1.00-1.18). Similarly, children with higher PFNA levels were more likely to have ADHD (OR=1.33 for $\mu\text{g/L}$ increase; 95% CI 0.91-1.95).

Conclusions: These results are consistent with an affect of PFCs on ADHD risk. Follow-up of these cross-sectional data with cohort studies is needed.

Epidemiology:

November 2009 - Volume 20 - Issue 6 - p S80

doi: 10.1097/01.ede.0000362949.30847.cb

Abstracts: ISEE 21st Annual Conference, Dublin, Ireland, August 25-29, 2009: Poster Presentations

Perfluorooctanoic Acid (PFOA) and Pubertal Maturation in Young Girls

Pinney, Susan M.; Windham, Gayle C.; Biro, Frank M.; Kushi, Larry H.; Yaghjyan, Lusine; Calafat, Antonia; Kato, Kayoko; Succop, Paul; Brown, M Kathryn; Hernick, Ann; Bornschein, Robert



Abstract

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OS10.5.4

Perfluorooctanoic acid (PFOA) and Pubertal Maturation in Young Girls

Susan M. Pinney¹, Gayle C. Windham², Frank M. Biro^{3,4}, Larry H. Kushi⁵, Lusine Yaghjian¹, Antonia Calafat⁶, Kayoko Kato⁶, Paul Succop¹, M. Kathryn Brown¹, Ann Hernick¹, Robert Bornschein¹

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Background: Polyfluoroalkyl compounds (PFCs) and their salts, such as perfluorooctanoic acid (PFOA), have been reported to change mammary gland structure and function in laboratory animals. We explored the relationship between serum PFOA concentration and timing of pubertal maturation in young girls.

Methods: Within the NIH Breast Cancer and the Environment Research Centers (BCERC), we conducted a study of multiple environmental biomarkers, including PFOA and other PFCs in serum of young girls (age 6-7 years at entry) from two sites (N=689 girls). Pubertal staging (breast (B) and pubic hair (PH)) has been conducted by clinicians or trained research staff, every year or more frequently, for as long as four years. After calculating adjusted geometric means for all PFCs, we examined the relationship between PFOA serum concentration at the beginning of the study with body mass index (BMI) and pubertal Stage 2 at baseline and one year follow-up.

Results: Detectable serum levels of five PFCs, including PFOA, were found in >95% of the girls. The PFOA median was 6.4 ng/ml (range < LOD 0.1 to 55.9 ng/ml), with 24.9% having values above the 95th percentile for children 12-19 years (NHANES 2003-2004 population (8.6 ng/ml)). At the follow-up visit, 28.3% of girls had reached Tanner stage B2+, 19.2% were PH2+ and 30.3% had a BMI percentile for age >85. In analyses where serum PFOA was modeled as a continuous variable, we found a direct relationship with pubertal breast status and an inverse relationship with BMI percentile at the follow-up visit, with adjustment for age, race, site and caregiver education.

Conclusions: It appears that PFOA acts as an endocrine disruptor although perhaps not by the usual mechanism. Although the relationship with BMI was inverse, there was a direct relationship with breast maturation. We continue to explore these complex relationships in models including other covariates.

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