

INTERIM REPORT
Epidemiology
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Title: Identification of Fluorochemicals in Sera of Children in the United States

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INTRODUCTION

The distribution of serum perfluorooctanesulfonate (PFOS) and other fluorochemicals among individuals from the general United States population has not been well characterized. In 1997, analysis of pooled blood samples ($n = 3$ to 6 samples which had 5 to 10 donors in each sample) from 18 blood banks in the United States resulted in a mean geometric mean of 28.2 parts per billion (ppb) of PFOS in the serum with a range from 15.9 to 51.5 ppb for the individual means from the 18 blood banks (3M Company, 1999).

In order to develop a better understanding of the serum fluorochemical distribution in the U.S. population of children, the 3M Company obtained repository serum samples from 599 children, age 2 - 12, who participated in a study of group A streptococcal infections (Kaplan et al, 1998). The purpose of this report is to provide preliminary data regarding the findings from this research endeavor.

METHODS

Through arrangements with the University of Minnesota, we obtained serum samples from 599 children, age 2 - 12, which were collected between January 1994 and March 1995. These children resided in 23 states in the United States. An equal percentage of male and female sera were chosen for fluorochemical analyses

Northwest Bioanalytical Inc. (Salt Lake City, Utah) analyzed 7 serum fluorochemicals using high pressure liquid chromatography/electrospray tandem mass spectrometry (HPLC/ESMSMS) and evaluated versus an extracted curve (Hansen et al,

2001). The seven analytes were: perfluorooctanesulfonate (PFOS); perfluorooxanesulfonate (PFHS); perfluorooctanoate (PFOA); N-ethyl perfluorooctanesulfonamidoacetate (PFOSAA); N-methyl perfluorooctanesulfonamidoacetate (M570); perfluorooctanesulfonamidoacetate (M556); and perfluorooctanesulfonamide (PFOSA).

RESULTS

Provided in Table 1 are the summary mean, median, geometric mean, range and 95% cumulative percentile for each of the seven fluorochemicals for the 599 sera samples. Additional statistical analyses are currently being done to examine the central tendency and distribution of the data by age, gender, location and their respective interaction terms. A reliability assessment, which examined split samples from a subset of the donors, is also being analyzed.

DISCUSSION

The findings in Table 1 must be viewed cautiously and only as preliminary data until a final report is issued. These data and statistical analyses have not completed quality assurance procedures. At this time, these preliminary results suggest that the mean serum PFOS level approximates 40 ppb in these 599 children donors although whether this varies by location, age, gender and their interactions is still under investigation. It is anticipated that a final report will be issued later in 2001.

REFERENCES

3M Company (1999). Perfluorooctane Sulfonate: Current Summary of Human Sera, Health and Toxicology Data. February 5, 1999 (unpublished report).

Hansen KJ, Clemen LA, Ellefson ME, Johnson HO (2001). Compound-specific quantitative characterization of organic fluorochemicals in biological matrices. *Environ Sci Technol* 35:766-770.

Kaplan EL, Rothermel CD, Johnson DR (1998). Antistreptolysin O and anti-deoxyribonuclease B titers. Normal values for children ages 2 to 12 in the United States. *Pediatrics* 101:86-88,

Table 1
Preliminary Descriptive Summary of Serum Fluorochemical Levels (ppb) in Children

Analyte	Mean*	Range	Median	Geometric Mean*	Cumulative 95 th Percentile
PFOS	43.5	6.7-515	36.7	37.5	90.2
PFOA	5.6	<LLOQ-56.1	5.1	4.9	10.2
PFHS	15.0	<LLOQ-712	3.8	4.5	71.3
PFOSAA	4.4	<LLOQ-23.8	3.7	3.3	10.4
M570	3.4	<LLOQ-48.0	1.8	1.9	12.5
PFOSA	<LLOQ	<LLOQ	< LLOQ	<LLOQ	<LLOQ
M556	3.0	<LLOQ-19.1	2.5	2.4	7.3

*Values that are < LLOQ were analyzed as the midpoint between zero and the <LLOQ

PFOA <LLOQ = (1.92) or (2.88)

PFHS <LLOQ = (1.36) or (2.41)

PFOSAA <LLOQ = (1.00) or (2.60)

M570 <LLOQ = (1.00) or (2.00)

PFOSA <LLOQ = (1.00) or (2.00) or no result. The analyses failed for PFOSA due to scatter in the calibrator values and less than ¾ of the calibrators were within the acceptance criteria. However, the QC results met the run acceptance criteria and the LLOQ samples deviated less than $\pm$ 5% of target. All PFOSA results were less than the LLOQ(1.00) for these samples.

M556 <LLOQ = (2.50) or (5.00)