

Status report: Factors associated with PFOA levels in a community surrounding a chemical plant

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This report summarizes the overall pattern of C8 levels measured in the blood serum of the participants in the C8 Health Project carried out in 2005-2006 in the Mid-Ohio Valley population. The extent to which the C8 levels vary in relation to the water district of residence, participants' age and other individual characteristics is explored by statistical models. A full report of these findings will be submitted to a peer-reviewed scientific journal.

Background: Perfluorooctanoic acid (PFOA, also known as C8) is a fluorocarbon which is present in the serum of most Americans at low levels (about 4-5 ng/ml), although the routes of exposure remain unknown. Here we examine factors associated with PFOA in a large population of mid-Ohio valley residents living near a chemical plant, which until recently released large quantities of PFOA into environment, contaminating drinking water.

Methods: The study population was 69,030 community residents living in six water districts contaminated by PFOA, who participated in a 2005-2006 survey (the C8 Health Project) involving a questionnaire and blood sample. Of these, 64,251 had complete data on PFOA blood level and other key information for the analysis. Additional analyses were conducted on a subset (71%) of subjects for whom we had occupational history. Median levels (middle value) of PFOA were calculated in relation to many different factors, like residence in a specific water district, working at Dupont, gender, age, etc. Median levels are a better indication of average levels than the actual arithmetic mean when a relatively small portion of the population has very high levels (which is the case here), skewing the arithmetic mean toward high levels. Linear regression models were also run to determine which factors were associated with serum PFOA levels, after adjusting for other factors.

Results: The arithmetic mean PFOA level of the entire population was 83 ng/ml, with a range from 0.25 to 22,412. The 75th percentile was 71, while the 25th percentile was 13. The median, or 50 percentile, was 28.

The most important predictor variables (in order) were current and past residence in a contaminated water district, and current or former employment at the chemical plant. Without adjusting for other factors, the median levels of PFOA for those currently (at time of survey) living in any of the six water districts was 38 ng/ml. Blood C8 levels for those currently living in

Little Hocking, Lubeck, Belpre, Tupper Plains, Pomeroy, and Mason were 224, 70, 35, 37, 12, and 12 ng/ml, respectively. Sixty-three percent of the population was currently living in one of these districts at the time of the C8 Health Project. Those currently living in water districts further from the plant had lower levels, as would be expected. Adjustment for other factors did not change these values very much.

Those no longer residing in contaminated water districts had lower levels than current residents (median 19 ng/ml). We grouped those not currently living in an exposed water district by the water district they listed as their ‘qualifying water district’, used to qualify for participating in the C8 Health Project. Participants were required to have lived, worked, or gone to school in their qualifying water district for at least a year. Most of these had lived previously in their ‘qualifying water district’. For those not currently living in a contaminated water district, their median levels based on qualifying water district of Little Hocking, Lubeck, Belpre, Tupper Plains, Pomeroy, and Mason were 34, 28, 17, 14, 11, and 11 ng/ml, respectively.

Based on the 71% of the population for whom we had an occupational history, 5% had ever worked at Dupont (2% current, 3% former). The median serum level of PFOA was 148 for current Dupont workers, 75 for former Dupont workers, and 24 for those who had never worked at Dupont.

PFOA was higher for men vs women; median 34 vs 24 ng/ml. Levels were somewhat higher for young people and old people, compared to those in between.

Conclusions: PFOA levels in this population vary with distance of residence from the plant and employment at the plant. The effect of age and gender reflected prior findings. Effects of other demographic and lifestyle covariates are relatively weak.