Status report: Residents’ PFOA serum concentrations before and after granular activated carbon filtration at public water systems in Little Hocking, Ohio and Lubeck, West Virginia

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This report summarizes the findings from the first year of the C8 Half Life Study, which follows 200 residents with repeated blood samples and interviews in order to study the rate of decline in PFOA serum concentrations over time. A detailed report will be submitted to a peer-reviewed journal for publication. Dr. Scott Bartell will be the principal author of this report; Science Panel member Dr. Kyle Steenland worked closely with Dr. Bartell on this report.
Summary

**Background:** Lubeck Public Service District began filtering public water in June 2007 in order to remove PFOA, and Little Hocking Water Association began filtering public water in November 2007. We are studying PFOA serum concentrations over time, including immediately after water filtration, in 200 residents served by these two water districts. The rate of removal, which can also be expressed as a “half-life” (the time required for half of the PFOA to be removed from the body), is critical for estimating past rate of exposures to PFOA based on recent PFOA serum concentrations. There is not much existing information on the rate of PFOA removal from the body. The best available study of the rate of removal of PFOA from the human body was based on only 26 retired PFOA workers with no recent PFOA exposures, including only 2 women.

**Methods:** In May 2007 we recruited 150 adults served by Lubeck and 50 adults served by Little Hocking, based on their responses in the C8 Health Project. Both men and women with a variety of ages were included. Participants were required to have a PFOA serum concentration measurement of 50 ng/mL or greater during the C8 Health Project; this level is about 10 times higher than the level found on the average among the general US population. Participants were also required to have residential water service provided by Lubeck Public Service District or Little Hocking Water Association, to have not reported growing vegetables at home at the time of the C8 Health Project, to have never been employed by DuPont Company, to not have had any other job working worked with PFOA since 2000, and to have signed a consent form allowing C8 Health Project data to be shared with the C8 Science Panel. Two groups of participants were recruited for each of the two water districts: 1.) those reporting primary use of public water for drinking at home, both in the C8 Health Project and in May 2007, and 2.) a smaller group consisting of those reporting primary use of bottled water for drinking at home. Participants donated up to 6 samples each during the first year of the study. The Lubeck participants were followed for one year after water filtration, and the Little Hocking participants were followed for three months prior to water filtration and six months after water filtration. Average decreases in PFOA serum concentrations are reported for 197 participants who donated blood before and after the installation of water filters in Lubeck and Little Hocking, as well as the estimated average half-life.
Results: Average serum PFOA concentrations in June 2007 for participants served by Lubeck Public Service District were 122 ng/mL among public water drinkers and 58 ng/mL among bottled water drinkers. Average serum PFOA concentrations in December 2007 for participants served by Little Hocking Water Association were 368 ng/mL among public water drinkers and 140 ng/mL among bottled water drinkers.

For Lubeck residential customers, the average decrease in PFOA serum concentrations in the year after filtration (between June 2007 and June 2008) was 32 ng/mL (26%) for those primarily consuming public water at home (n=130), and 16 ng/mL (28%) for those primarily consuming bottled water at home (n=17). For Little Hocking customers, the average decrease in PFOA serum concentrations in the six months after filtration (between December 2007 and June 2008) was 39 ng/mL (11%) for public water consumers (n=39) and 28 ng/mL (20%) for bottled water consumers (n=11). The estimated average rate of decrease in serum PFOA concentration after water filtration for all four groups is 26% per year. Our best preliminary estimate of the average PFOA serum half-life using these data is 2.3 years (95% CI: 2.1 to 2.4 years). Individual estimated half-lives varied widely in our study; most lie between 1.5 to 4.6 years.

PFOA serum concentrations were already decreasing over time before filtration began among Little Hocking residents, but the average rate of decrease was estimated to be 60% faster after filtration.

Interpretation: PFOA serum concentrations have decreased substantially among our study participants between 2007 and 2008; much of this decrease appears to be due to water filtration. “Bottled water drinkers” reported primarily drinking bottled water while at home, but may have routinely used public water for cooking, coffee, etc., or may have been exposed at work or other locations besides home. During our study some individuals also switched from public to bottled water, or from bottled to public water. These factors may explain why filtration appeared to be effective at decreasing serum PFOA concentrations among both public water drinkers and bottled water drinkers.

Long half-lives cannot always be accurately calculated from shorter studies. We will be requesting two more blood samples from our participants during the next few years, and expect to report more precise half-life estimates when this study is completed in 2012.