



East Metro PFC Biomonitoring Follow-up Project May 2013 Report to the Community Survey Analysis: How are participants exposed to PFCs?

What is the East Metro PFC Biomonitoring Follow-up Project?

In 2010-2011, the Minnesota Department of Health (MDH) conducted a study in the East Metro area which involved measuring PFCs in the blood of 164 residents and collecting detailed survey information regarding possible sources of exposure to PFCs. The blood samples were collected from people who had participated in an earlier MDH biomonitoring project done in 2008.

We found that efforts made to reduce drinking water exposure to PFCs in the East Metro were effective: blood levels of the three main PFCs measured (PFOS, PFOA, and PFHxS) declined substantially from 2008 to 2010 among those studied.

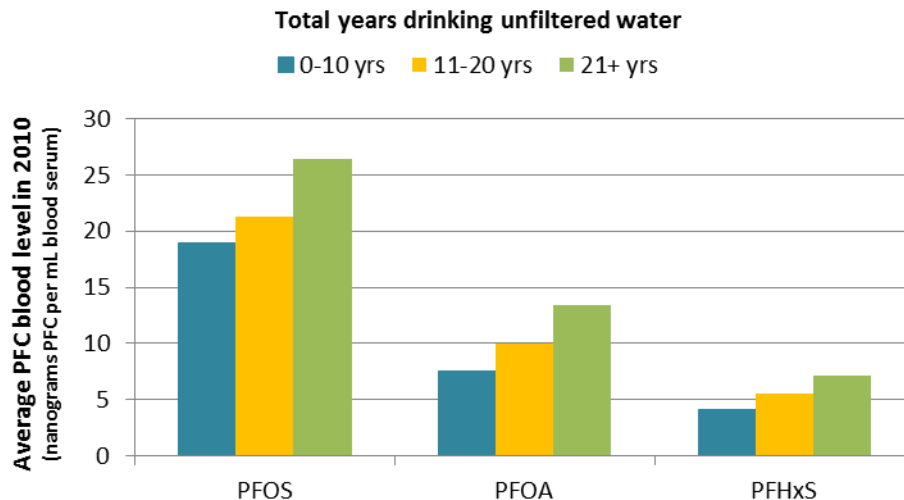
We also wanted to learn more about how people are exposed to PFCs by studying participants' survey responses. These results are described below.

How do these results differ from what MDH presented before?

In the 2008 project, we collected very limited information about each participant. The follow-up project's survey asked for more detail about how long people lived in the community and drank the water. It was important to know whether people had lived at other addresses in the community; the 2008 project only asked about current residence. The survey also asked about other possible sources of exposure to PFCs, such as diet and product use.

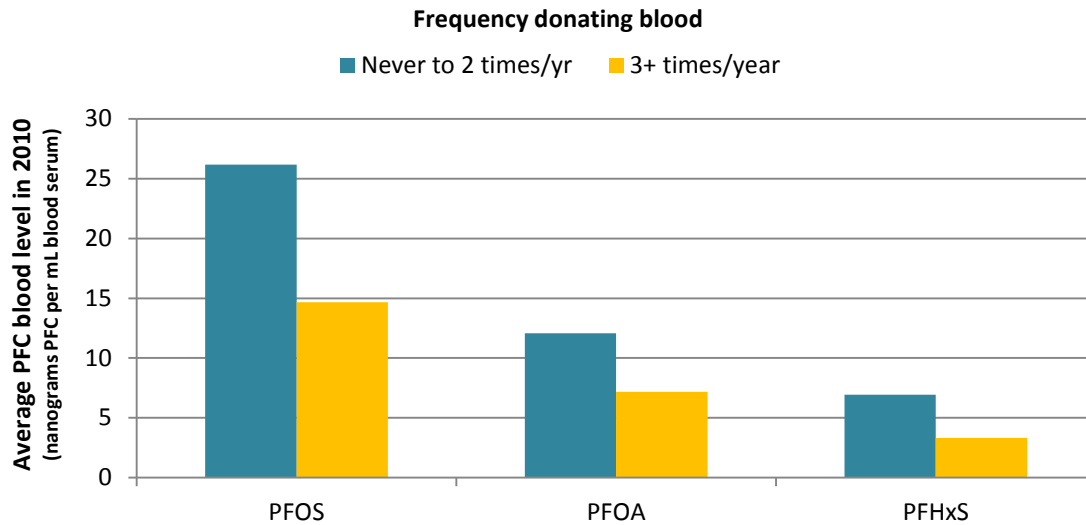
What did we learn about how people in the East Metro are exposed to PFCs?

1. Participants who drank unfiltered water for more years had higher PFC levels (see below).
This was true even after accounting for other factors such as age, gender, and blood donation. We calculated the total number of years that each participant drank unfiltered water (both city and private well water) at all current and former addresses in Oakdale, Lake Elmo, and Cottage Grove. It was important to know peoples' residential history because more than 60% of participants had lived at 2 or more addresses in these towns. We also found that the more water a person drank, the higher their PFC levels were.



2. Participants who donated blood frequently had lower levels of PFCs.

The 14 people who donated blood 3 or more times per year had lower levels of PFCs than participants who did not donate blood or who did so less often (see below). Again, this was true after we accounted for other factors such as age, gender, and years drinking unfiltered water. This result makes sense because we know that PFCs bind to proteins in blood. Levels of PFCs measured were very low and it is still safe and important to donate and receive blood.



3. For the most part, diet and use of products were not linked to higher PFC levels.

We asked a lot of questions about diet (how often people ate certain foods, including red meat, fast food, microwave popcorn, pizza, take-out beverages, and produce from their home garden) and product use (including how often people used non-stick cookware, waterproof spray, and stain resistance treatments on carpets and furniture). We did not find relationships between most of these factors and PFC levels in the blood. We did find that people who had new carpeting installed in their home in the last year had higher levels of 3 PFCs, but the number of people involved was small and this should be studied further.

What do these results mean?

These results confirm that drinking water was a major source of exposure to PFCs in East Metro communities and that efforts to reduce this exposure were key in bringing down blood levels between 2008 and 2010.

Despite asking participants about diet, product use, and other possible sources of exposure to PFCs, our analysis did not find many clear associations with PFC blood levels. In people who don't have major drinking water exposure, researchers think that diet is the main source of PFC exposure; house dust may be important as well. For people in this project, drinking water was the dominant exposure, so the contribution from other sources would be small in comparison. Also, many sources of exposure to PFCs exist, and because we don't understand some of them very well, we may have missed them in the survey. Finally, the number of participants in our study was relatively small, making it more difficult to see possible relationships.

What about other PFCs?

We tested participants' blood for 4 other PFCs: PFBS, PFPeA, PFHxA and PFBA. We detected PFBS, PFPeA, and PFHxA in 5% or less of participants. We detected PFBA in 21% of participants, at very low levels.

We are interested in PFBA because it is found widely in East Metro groundwater. It is also present in rain water, house dust, and many household products. PFBA is very different from PFOS, PFOA, and PFHxS (the other PFCs discussed) – it stays in the body for only a few days, while the other 3 PFCs stay for 3-8 years.

We found that people who had detectable PFBA in 2008 were more likely to have detectable PFBA in 2010, which suggests some ongoing sources of exposure. But we could not tell what those sources are from our survey analysis. As we saw with the other PFCs, the chance of detection increased with age and was greater in men.

Did survey responses help explain why PFC levels in a small group of participants did not go down between 2008 and 2010?

The table below shows that people in the group whose levels did not go down from 2008-2010 had much lower PFC levels to begin with in 2008 compared to those whose levels did go down. In most cases, PFC levels in people in the first group were lower than the 2010 project average.

These people probably did not have major drinking water exposure to PFCs, so PFC reductions in their drinking water would have had less effect on their 2010 levels. They were also less likely to have donated blood.

We did not find a connection with any of the foods or products we asked about on the survey. Some variability is normal in lab measurements, so a small change in levels from 2008-2010 may not reflect a “real” increase or decrease. There are also biological differences in how quickly people clear PFCs from their bodies.

	PFOS (ng/mL)	PFOA (ng/mL)	PFHxS (ng/mL)
Average 2008 PFC level: People whose levels did not go down from 2008-10	10	9	2
Average 2008 PFC level: People whose levels went down from 2008-10	35	15	8
Average 2010 PFC level: Entire East Metro project	27	12	6

* Averages shown are geometric means, often used for comparing biomonitoring results. They account for differences in age, gender, years drinking unfiltered water, and blood donation.

What do we know about the health effects of PFCs?

Researchers continue to actively study the possible human health effects of PFC exposure. The science has grown in the last two years. Papers are regularly published in scientific journals on a range of health outcomes in different groups of people. While these studies do not all come to the same conclusions, results so far have not shown consistent evidence that exposure to PFCs causes specific illnesses in people.

What is the update from studies of the Ohio River Valley community?

Scientists are investigating a number of health outcomes in people exposed to high levels of PFOA in a West Virginia/Ohio community. Average exposures to PFOA were around 10 times higher in this community than in MDH East Metro biomonitoring project participants. Full scientific findings have not been published yet, so we do not know how the results will inform our understanding of the effects PFCs may have on human health in Minnesota.

However, a panel of 3 scientists chosen as part of a legal settlement was charged with making a determination about whether there is a “probable link” – whether it is “more likely than not” that a link exists – between exposure to PFOA and disease in the Ohio River Valley community. The panel found that there is a “probable link” for a small number of health conditions, and that there is not a “probable link” for many others. These findings are part of a court settlement and not a definitive scientific conclusion. More work needs to be done to determine if the links are truly cause-and-effect or if they are due to other factors.

What will happen next?

MDH programs will continue to test East Metro water for PFCs, including water from municipal supplies and private wells, to ensure that levels do not exceed health limits. If funding allows, MDH will continue PFC biomonitoring in the East Metro to be sure that PFC blood levels of residents who were exposed to contaminated drinking water continue to decline.

If you have health concerns, contact your medical provider. It is also important to continue to get the regular check-ups and health screenings that your provider recommends.

Where can I learn more?

- More resources from the East Metro PFC Biomonitoring Follow-up Project: <http://www.health.state.mn.us/tracking/biomonitoring/projects/eastmetropfc.html>
- MDH’s Minnesota Public Health Data Access, including more information about PFCs in people: <https://apps.health.state.mn.us/mndata>
- MDH Division of Environmental Health overview of PFCs in Minnesota: <http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/index.html>



For more information, contact the Environmental Public Health Tracking and Biomonitoring Program at MDH.

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