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What Is a Safe Level of PFOA?

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Credit: Storyblocks [1]

By Dr. Jenifer Heath

Perfluorooctanoic acid (PFOA) is a chemical commonly found in household products. Its purpose is to resist stains, grease, and other assaults.

Like many other chemicals, PFOA has been in the news for several years. In many workplaces and communities, PFOA has become a household name, triggering fears of adverse health effects and expensive, never-ending environmental cleanups. What's going on?

The most immediate problem is that there is no agreed upon standard for what constitutes a "safe" dose of PFOA. Federal- and state-level regulations are in a state of flux, with agencies developing "risk-based" criteria that vary by two orders of magnitude (i.e., a factor of 100).

Consider this: According to a table (Excel file [2]) by the Interstate Technology Regulatory Council (ITRC), the lowest enforceable criterion for PFOA is 0.02 ppt (parts per trillion), and the highest enforceable criterion is 2 ppt. To make matters more confusing, the U.S. EPA had issued its own (non-enforceable) drinking water health advisory for PFOA. It's no surprise, therefore, that citizens wonder why a value that's "safe" for residents of one state is not "safe" for residents of a neighboring state.

The lack of a coherent plan in regard to PFOA has resulted in costly environmental investigations and pending cleanups of PFOA in groundwater and drinking water. All this garners media coverage, which just adds fuel to the fire.

It's important that regulators get this right. Environmental cleanups are expensive, and they should not occur if there is no scientific justification for them. Incorrectly condemning a water source as

“contaminated” causes emotional stress due to (unfounded) fears of adverse effects. And farmers who grow crops may face financial hardship if people assume there are unsafe levels of PFOA in irrigation water.

Getting PFOA Risk Right

In general, criteria for PFOA have been based on rodent studies, and most consider developmental (fetal) toxicity to be the most sensitive adverse effect. This toxicity appears to occur primarily only after the dose is high enough to be toxic to the pregnant dam. These results may or may not apply to the children of pregnant humans who are not overtly sickened by the exposure.

Three things must be clarified in order to get PFOA risk right:

First, toxicologists must agree on a common measure of dose. Either Maximum (or peak) Concentration (Cmax) or the Area Under the Curve (AUC) may be used used, but they mean different things. Cmax is the highest concentration achieved in the blood following a specific exposure, whereas AUC sums the concentration in blood over time for the given exposure. In the case of PFOA, the choice of AUC or Cmax could make a substantial difference in the calculated drinking water criteria.

Second, toxicologists must find a way to reconcile data from humans and mice. New information has been uncovered in humans that could support a scientifically based, chemical-specific adjustment to apply animal data to human toxicity*.

Third, toxicologists must understand how PFOA is eliminated from the human body. The process and pace of elimination varies significantly across chemicals and is an important determinant of toxicity.

Half-life is the amount of time it takes for the concentration of a chemical to be reduced to one half of its original concentration in the body. Measured half-lives of PFOA in humans vary from one to several years. Because half-life can be affected by background sources of PFOA (i.e., ongoing intake) and PFOA is widely present in the environment, a measured half-life could greatly underestimate elimination of PFOA from the body.

The best regulatory decisions are based on sound science. Toxicologists have learned a lot about PFOA and are on the verge of working towards better transparency and potential consensus on some key issues. Prudent patience now will yield better criteria for PFOA, yielding protection of public health.

Jenifer S. Heath, Ph.D., is a Toxicologist with over 25 years of experience in her field. She has testified in depositions and at bench and jury trials. Dr. Heath helps her clients understand the potential adverse effects of chemical exposures in order to make better informed decisions.

*Note: Elcombe, C.R., C. R. Wolf, and A.L. Westwood. 2013. US Patent Application Publication, Pub. No.: US 2013/0029928 Al, January 31.

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