

Practice Prevention



Chemicals have made our lives so much easier and better. We have pans and appliances that are stick-free and easy to clean. We have

clothes, carpets and furniture that repel things that might stain them. Carpets, furniture, drapes, and clothes can be made more fire-resistant. Our cosmetics, soaps and shampoos can be applied more easily and perform better. Thanks to modern chemistry, we truly can live a more comfortable life.

But we now know that there has been a price for these conveniences. This article discusses the primary chemicals that are used provide these comforts – PFCs. These chemicals have made certain aspects of life easier, but they are also known environmental toxics that may impact your health and that of your family.

There is a proverb that says, “If you pick up one end of a stick, of necessity you must also pick up the other end.” In this case, it is clearly important to get the whole picture and read the facts. Think about the suggestions for reducing your exposures to PFCs. You may struggle a bit when having to choose between the conveniences you have come to enjoy and reducing the health risks these chemicals may impose on your loved ones. The good news, however, is there are safer alternatives. And most important, by reducing exposures to these chemicals – for the same reason you have your children wear bike helmets and sit in car seats – you can know you are doing everything possible to protect your family.

- Larry B. Silver, MD

PFCs *Perfluorinated chemicals, including PFOA / C8*

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Perfluorochemicals (PFCs) are a family of chemicals present in nearly every American home. They have also been found in people by the Centers for Disease Control and in other smaller biomonitoring studies. Emerging science suggests that they may contribute to a variety of human health problems.

What are PFCs?

These compounds are used in a wide variety of consumer products to make them repel water, grease or stains; as surfactants; and as fire suppressors.^{1,2} They can be found in many products:

- nonstick pots and pans (such as Teflon® and SilverStone®)
- stain-resistant upholstery and carpets (such as Stainmaster® and Scotchgard®)
- cosmetics and shampoos
- stain-resistant or water-resistant clothing and shoes (such as Gore-Tex® and Scotchgard®)
- food wraps and paper packaging such as popcorn bags
- cleaners and floor wax
- electronics
- paints and coatings
- fire-fighting foams

PFOA (perfluorooctanoic acid), also called C8, is one type of PFC. It is used in the

production of PFCs such as Teflon® nonstick coatings for cookware. Many PFCs break down and eventually become PFOA² or the more toxic PFOS (perfluorooctane sulfonate).³

PFOA and PFOS are extremely durable chemicals – sun, water, microbes and other environmental exposure do not break them down. PFCs are light and easily distributed throughout air and water, and thus PFOA and PFOS can be found all over the world in locations far from the original source of contamination.⁴ PFCs have been found in human blood samples from all over the country.⁵

The US Environmental Protection Agency (EPA) has established a provisional drinking water advisory for two PFCs: PFOA at 0.4 micrograms per liter (µg/L) and PFOS at 0.2 µg/L.¹ In 2000, EPA and 3M, the international company that develops and manufactures these chemicals, announced a phase-out of PFOS due to potential health concerns.⁶

How do PFCs affect health?

Despite the fact that PFCs are common worldwide – found in air, soil, water and living organisms – little research has been done on how they may affect humans. A few studies have shown an association between the level of PFOA in mothers' blood and slightly lower birth weights and/or head circumference in their babies⁷ (head circumference is one indicator of problems with neurological development⁸). Another study found slightly higher levels of both birth defects and low birth weights with high levels of some PFCs.⁹

Other studies show health effects at exposure levels seen in adults throughout the US: elevated levels of serum PFOA and PFOS have been associated with increased cholesterol,¹⁰ reduced fertility,¹¹ and thyroid disease.¹² This last effect is of great concern for pregnant women since thyroid deficiencies affect the developing brains of their children.

Studies conducted by the chemical industry on workers have documented associations between

PFOA levels and higher rates of mortality from prostate and bladder cancer as well as changes in cholesterol and increased levels of estradiol, a sex hormone.^{13,14} Firefighters may also be at greater risk due to exposure to contaminated smoke and dust during fires, as seen at the World Trade Center collapse,¹⁵ although the health effects among firefighters is not yet known.

Animal studies have more clearly suggested that these chemicals may pose health risks. Some animal studies, for example, have associated PFCs with harm to multiple organ systems and in multiple species, with changes in the liver, spleen and kidneys,^{14,16} weakened immune system¹⁴ or delays in maturation and an increased risk of death during weaning than those in the unexposed control group.¹⁷ PFOA has been linked to cancer in rats¹⁴ and altered mammary gland development in mice.¹⁸ More research is needed to define and protect against harmful effects from these chemicals.

How are we exposed to PFCs?

The most common sources of PFCs in the environment are industrial waste disposal and consumer products to which PFCs have been applied or added.¹³

PFOA has been detected in tap water, rivers, city air, soil and food purchased from grocery stores worldwide. Much of this contamination is the result of companies disposing of waste chemicals via incineration, allowing PFOA to escape into the air, and discharging waste fluids, contaminating water and soil. The highest concentrations of PFOA and other PFCs are seen around the industrial facilities that discharge them, but since PFOA is resistant to degradation and is highly mobile, the contamination easily spreads to locations far from the point of origin.¹⁹ PFCs are not typically removed by municipal water treatment.²⁰

A second source of exposure is through consumer products that are made using PFOA or other PFCs. Nonstick cookware, stain-resistant clothing, carpet

or furniture and some cleaning, cosmetic and personal-care products are all sources of PFOA and other PFCs. Chemicals that escape from these products may contaminate the air and dust in homes, schools and other buildings. PFCs have also been found to migrate from food packaging into foods²¹ and are present in many foods²² and in human breast milk.²³

Some studies have shown that children tend to have higher levels of certain PFCs in their blood than adults. These blood levels may even approach those measured in workers at industrial plants where PFOA is used in production.¹⁴ This is evidence that children are either exposed at higher levels or are not as effective at ridding themselves of the chemical. Because animal studies suggest that developing animals are more vulnerable to the effects of PFOA, this is troubling. PFCs are metabolized and excreted from our bodies slowly,²⁴ so any exposures will be with them for years.

What can you do to reduce your risk?

- Avoid using nonstick pans for cooking, and do not use them at high heats which cause the coating to off-gas PFOA and many other toxic chemicals.²⁵ Cast iron and stainless steel are good alternatives (avoid aluminum).
- Do not choose carpeting, upholstered furniture or clothing that have been treated for stain or dirt resistance with PFC-based coatings. Ask salespeople or store managers, as items are not always labeled as to treatments.
- Avoid purchasing cosmetics and cleaning products that contain PFCs. Look for brands that have signed the “Compact for Safe Cosmetics” (www.safecosmetics.org) or search for and avoid any products containing “perfluoro” ingredients on product labels, in the Household Products Database (<http://householdproducts.nlm.nih.gov>) or in the Skin Deep database (www.cosmeticsdatabase.com).
- Keep your house as free of dust as practical. Dust with a damp cloth, damp mop and vacuum regularly to remove dust and keep it from swirling through the air.
- If tests have shown that your water supply is contaminated with PFCs, particularly PFOA or PFOS, or if you live in an area where contamination is a concern, use a granular-activated carbon filter to remove these chemicals from water that your family drinks and uses in cooking.^{13,20}
- Be especially aware of PFC exposure during pregnancy and your child’s infancy. These are the highest-risk time periods for exposure.
- Urge your elected officials and health professionals to promote research into the effects of PFCs on human (and especially children’s) health. Advocate chemical policy reform in order to reduce the health risks that exposures to chemicals may pose.

This and other Practice Prevention columns are written and published by LDDI staff at the Collaborative on Health and the Environment, with an introduction provided by **LDDI Medical Advisor Dr. Larry B. Silver**. Dr. Silver is a child and adolescent psychiatrist and clinical professor of psychiatry at Georgetown University Medical Center. He has published several popular books for parents, educators and clinicians about learning disabilities, attention deficit hyperactivity disorder, health and mental health. Past president of the Learning Disabilities Association of America, he received their Learning Disabilities Association Award. He also received the Berman Lifetime Achievement Award from the American Academy of Child and Adolescent Psychiatry for his contributions to the study and treatment of learning disabilities. More information is available on the LDDI website: www.healthandenvironment.org/initiatives/learning/r/prevention.

For more information or for other Practice Prevention columns, visit the Learning and Developmental Disabilities Initiative online at www.disabilityandenvironment.org or call 360-331-7904.



Footnoted resources

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(Continued on page 4)

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