Perfluorinated chemicals - (incl. PFOS/PFOA)

Persistent ✓
Bioaccumulative ✓
Endocrine disrupter ✓

BACKGROUND

NB: This study looked for 13 different perfluorinated chemicals in blood samples. However, due to the lack of available information on these chemicals, the content of this fact sheet is almost exclusively based on the information available on PFOS/PFOA.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are members of a chemical group known as perfluorinated chemicals (PFCs), characterised by chains of carbon atoms of varying lengths, to which fluorine atoms are strongly bonded. PFOS and PFOA can be produced synthetically or by the breakdown/metabolism of other PFCs. PFCs are heat stable, extremely resistant to degradation and environmental breakdown, and repel both water and oil. It is these properties that are exploited in their various applications, ranging from non-stick pans, stain/water repellents for clothing/furniture to floor waxes and paper coatings (for instance Teflon, Gortex, Stainmaster and Scotchguard).

The properties that make PFCs so effective in these products are also the reason why they tend to persist in the environment. Research has revealed that PFOS is now a ubiquitous environmental contaminant, bioaccumulating in wildlife and humans. PFOS has been detected in polar bears in the arctic, dolphins in Florida, seals in the Baltic Sea, otters in California, eagles and albatross in the mid-Pacific, whales in the North sea, in the blood of loggerhead turtles and in the blood of humans world-wide.

In May 2000, under pressure from the US Environmental Protection Agency (EPA), US company 3M announced that by the end of 2001, PFCs used in its extremely successful Scotchguard products would be phased out. This was due to grave concerns over the widespread distribution and persistence of perfluorinated breakdown products of these PFCs (PFOS, PFOA) in wildlife and humans.

MAJOR USES

PFCs have been widely used as industrial surfactants and emulsifiers and their stain/water resistant properties have meant that they have found themselves widely employed in numerous consumer products. Non-stick pans, carpets, furniture, household cleaners, shampooos, shoes/clothing and packaged food containers are just some of the products that can contain PFCs. A vast array of industrial products and processes also make use of the heat stable, non-stick properties of PFCs.
HOW MIGHT I BE EXPOSED TO PERFLUORINATED CHEMICALS?

You might be exposed to perfluorinated compounds through the use of the myriad consumer products that contain them (see above). Use of non-stick pans has been shown to produce PFOA containing fumes which can be inhaled in the kitchen. Due to lack of regulation, chemical companies have not been required by law to monitor or report emissions of PFOA, PFOS or other PFCs into air, water or landfills, so environmental contamination is widespread, and exposure by some route is almost inevitable. PFOS has been detected in fish, shellfish and drinking water so dietary exposure is also possible.

HOW CAN PFOS/PFOA AFFECT MY HEALTH?

The unique physical properties of perfluorinated chemicals that make them such good waterproofers and stain repellents (i.e. they repel water and oil) mean that they do not accumulate in fat, like many other persistent bioaccumulative chemicals, but in protein. This does not mean however, that they are more easily eliminated, and PFCs such as PFOS can therefore build up to high levels in our bodies and those of wildlife. The half-life (the time taken for half the amount of a chemical to be metabolised or eliminated) of PFOS in humans is in the region of 8-9 years. Continued exposure also means that levels of PFCs in our bodies may never be completely removed over our lifetimes.

Information has come to light recently, concerning the potential developmental, reproductive and systemic toxicity of PFOS. PFOS has been shown to effect the neuroendocrine system in rats and other rodent studies have demonstrated maternal and developmental toxicity due to PFOS, with a host of birth defects and compromised survival in newborns. PFOS has been shown to accumulate in the liver and to cause toxicity in this organ (hepatotoxicity). There is also evidence that exposure to PFOS and PFOA may cause thyroid dysfunction, which, during pregnancy, can lead to many developmental problems. The US EPA also considers both PFOS and PFOA to be carcinogenic and occupational exposure to PFOS has been correlated with increased incidence of bladder cancer.

HOW CAN FAMILIES REDUCE THEIR RISK OF EXPOSURE TO PFOS/PFOA?

Switching from non-stick pans to cast iron or non-coated pans can reduce you and your family’s exposure to perfluorinated compounds that are liberated during heating. Avoid the use of stain/waterproofing products to treat furniture, shoes and clothing where possible. When you purchase furniture or carpets, decline optional treatments for stain and dirt resistance, and find products that have not been pre-treated with chemicals by questioning the retailers. Minimise packaged food and greasy fast foods in your diet as these can be held in containers that are coated with PFCs to keep grease from soaking through the packaging. Avoid buying cosmetics and other personal care products with the phrase "fluoro" or "perfluoro" on the ingredient list.
REGULATORY STATUS

- Following intense regulatory pressure from the U.S. EPA, PFOS, the active ingredient used for decades in the original formulation of 3M's popular Scotchguard products, was taken off the market in 2000. Shortly thereafter, 3M also ceased manufacture of PFOA.
- The US EPA also considers both PFOS and PFOA to be carcinogenic.

Further information:

http://www.ewg.org/reports/pfcworld/index.php


http://www.epa.gov/oppt/pfoa/pfoara.pdf