

Slamming Teflon and PFOA

By ACSH Staff — February 22, 2006

Pop the bag into the microwave and in two minutes you can be stuffing handfuls of greasy popcorn into your mouth -- along with a dose of perfluorochemicals! Consumers may be quite willing to put up with messy hands when they eat popcorn, but they certainly don't want to see an oil-stained package on the shelf. And that's where perfluorochemicals come in. Added to the packaging material, they impart grease-resistant properties. Unfortunately, they also have a tendency to migrate into the oily goo that is added to the popcorn to simulate butter. So why should we care? Because there is an indication that such package coatings may be a source of perfluorooctanoic acid (PFOA) [1], a compound found in the blood of virtually all North Americans -- and PFOA is suspected of being a carcinogen.

Everything (Or About Half of Everything) Causes Cancer, Sort Of

But before anyone starts to organize street demonstrations to ban microwave popcorn, a few thoughts on carcinogenicity are in order. By definition, a carcinogen is a substance capable of triggering cancer in man or animal. So far, some sixty substances have been classified as human carcinogens. These include asbestos, alcohol, certain arsenic compounds, benzene, tobacco smoke, soot, estrogen, mustard gas, radon, ultraviolet light, tamoxifen, vinyl chloride, and wood dust. Human epidemiological studies have clearly shown that exposure to these substances is linked with cancer. Furthermore, there are reasonable molecular mechanisms to explain how these chemicals can cause the disease. Dosage, of course, is important -- you don't get cancer from smoking one cigarette.

Aside from established human carcinogens, there are a large number of substances known to be animal carcinogens based on feeding studies. [In most cases the dose to which the animals are exposed is so large that it is difficult to establish human relevance.](#) ^[2] Consider for example furfural, a compound used in some plastic manufacture, but one that also occurs naturally in grains, sweet potatoes and even apples. There is no doubt that it is a carcinogen. Feed it to rodents at a dose of 200 mg per kg of body weight and it will cause cancer. Since bread is made from grains, it will contain furfural. By referring selectively to the scientific literature, one could then argue that bread can cause cancer. Of course, [panic in the pantry](#) ^[3] would only ensue if a little detail were left out, namely that a person would have to consume roughly 6,000 loaves of bread a day to approach the amount of furfural that causes cancer in rodents! There are numerous other substances, both natural and synthetic that can rightfully be labeled animal carcinogens. Caffeic acid in coffee, acrylamide in French fries, safrole in black pepper, certain pesticides, PCBs, dioxins, and some fluorinated compounds, fall into this category. But that does not mean that pepper or coffee cause cancer. In fact we have good evidence that they don't. The "carcinogens" (more accurately, rodent carcinogens) are there all right, but not in a sufficiently high dose to have any adverse effect on humans.

Singling Out Teflon

Now let's return to the PFOA issue. Thanks to phenomenal advances in analytical chemistry, we know that this chemical is present in most people's blood to the extent of roughly five parts per billion. A part per billion is one second in thirty-two years, or one toilet tissue in a roll stretching from New York to London. Obviously we don't have much PFOA in us, but why do we have any at all? Where is it coming from? Accusing fingers have been pointed at Teflon producers. The "emulsion polymerization" by which this plastic is manufactured requires oily substances to be mixed with water. This is a job for chemicals called surfactants, and PFOA fits the bill perfectly. The surfactant is not present in the finished product, so Teflon pots and pans do not release it.

Truth be told, DuPont, a major Teflon producer, until recently has been less than fastidious about containment of PFOA and ended up contaminating the water supply around its Parkersburg, WV plant. This led to allegations of increased cancer rates in the community and a class action lawsuit that the company settled for over \$300 million. DuPont officials did not admit any guilt and pointed out that the cancer studies did not control for possible causes other than PFOA. More recently, the company was penalized \$10.25 million by the Environmental Protection Agency for not having reported some toxicological studies it had carried out, one of which showed that PFOA was found in the umbilical cord blood of a baby born to a woman working in the Teflon producing plant. The fine was for not having reported the data, not for endangerment.

The release of PFOA from the plant, though, does not explain the widespread distribution of this chemical. Nevertheless, EPA has asked manufacturers to reduce PFOA emissions by 95% by 2010 and to stop emitting it totally by 2015. This presents a real challenge to the industry because Teflon is an extremely useful material and alternative surfactants are hard to come by. In any case, eliminating PFOA from Teflon production will not eliminate the problem of the chemical showing up in blood, since this is not its major source. A more likely scenario, effectively demonstrated by University of Toronto chemist Scott Mabury, is that short chain fluorochemicals,

or "fluorotelomers," which are widely used in food packaging, coatings, paints, firefighting foams, inks, adhesives, and waxes can break down in the environment, or in the human body, to release PFOA. Alternatives for these will have to be found. This is not an easy task, but chemists have solved more difficult problems before.

And what happens if we do not reduce PFOA in the environment? It is a persistent chemical, that much is for sure. Researchers at Johns Hopkins University have found it to be present in the umbilical cord of virtually every baby born. But is it causing any harm? So far, there is little evidence for this. Studies of DuPont workers who have been exposed to amounts orders of magnitude greater than the public have not revealed any increase in cancer rates, although there is a suggestion of elevated cholesterol levels. Indeed, the EPA's own risk assessment suggesting that PFOA is a possible carcinogen is based on very weak data. The rat studies are equivocal, and the report clearly states that "the mode of action by which PFOA may cause tumours in rats is unlikely to occur in humans."

What's the conclusion then? Headlines such as "Teflon chemical causes cancer" or "Dangers Lurk in Teflon Pans" are sensationalist misrepresentations of the facts. There is no evidence that at 5 ppb in the blood PFOA does any harm. Of course, in the world of science it is always possible that new information will come to light, but based on what we know so far, there is probably more reason to worry about the saturated fat in the microwave popcorn than about the fluorotelomers in the packaging. And of course, you can always make old-fashioned popcorn. Just take a pan, heat a little oil, and add the kernels. And if you don't want the corn to burn and produce carcinogens -- use a Teflon pot!

Dr. Joe Schwarcz is Director of the McGill University Office for Science and Society. Also see: ACSH's [full report on Teflon and PFOA](#) [1].

COPYRIGHT © 1978-2016 BY THE AMERICAN COUNCIL ON SCIENCE AND HEALTH

Source URL: <https://www.acsh.org/news/2006/02/22/slamming-teflon-and-pfoa>

Links

[1] http://www.acsh.org/publications/pubid.1076/pub_detail.asp

[2] http://www.acsh.org/publications/pubid.990/pub_detail.asp

[3] <http://www.amazon.com/gp/product/0879757329/002-2912023-8222469?v=glance&n=283155>