Stainless Steel: Potential Problems

(As Found in Stents, Cookware, Silverware)

Lancet, 2000; 356: 1895-1897

Contrary to common beliefs, contact with stainless steel may not be inert and benign. A new study has found that stainless steel coronary stents may trigger allergic reactions to substances such as nickel, molybdenum, or chromium, which are released. These allergic reactions may be a major factor in causing in-stent restenosis.

The researchers looked at 131 patients (avg. age 62 years) with coronary stainless-steel stents who underwent angiography for suspected restenosis. The average time since the stents were inserted was about 6 months. All patients underwent allergy skin tests for nickel, chromate, molybdenum, manganese, and small stainless-steel plates. In-stent restenosis (50% diameter stenosis) occurred in 89 patients. All 10 patients with positive patch-test results had restenosis (4 had positive reactions to molybdenum and 7 patients had positive reactions to nickel).

The authors conclude that "Allergic reactions to nickel and molybdenum released from stents may be one of the triggering mechanisms for in-stent restenosis."

COMMENT:
This study shows that the use of stainless steel in contact with humans is not always inert. Although this study was not done on cooking with stainless steel, it does show that sensitive individuals can have adverse reactions to stainless steel devices placed into their body. Studies show that some of the ions which are released from stainless steel devices are able to destroy or damage enzymes and proteins, in addition to causing allergic reactions.

Stainless steel

Stainless steel alloys all contain nickel, chromium, molybdenum, iron, carbon and various other metals. Most doctors do not realize is that nickel can be just as toxic as mercury. Some doctors believe that

nickel is actually more toxic than mercury. Nickel is very likely more toxic than mercury and is the main reason for concern in using stainless steel cookware. It is unknown how many nickel ions are liberated during the cooking process with stainless steel cookware. Using stainless steel cookware in which the food touches the metal is best avoided.

Aluminum
Avoid aluminum cookware. Consuming small amounts of aluminum (gradually scraped off the pan over time) can bio-accumulate and create internal toxicity and is linked to Alzheimer's and other diseases.

Teflon
Avoid using Teflon-coated cookware. Research shows that fluoride can be released from Teflon into food. As scratches develop on the pan's surface, bits of the Teflon end up in your food. Under the Teflon is the typical metal, aluminum. As scratches develop, the food begins to come into contact with aluminum and you may end up eating small amounts of aluminum mixed into food. Higher temperatures increase the rate of leaching.

Ceramic Cookware
Some types of ceramic-coated metal for cookware are radioactive so, buyer beware.

Recommended Cookware & Silverware:
Our top choice for cookware is surgical-grade stainless steel cookware.

There are two types of stainless steel -- one type that is attracted to magnets, the other type is not. The best type is the magnetically-attractive type of stainless steel, which usually has a very low or no nickel content and does not leach nickel into food.

Avoid using "silverware" which is often made of high-nickel stainless steel (which can leach into food). Instead, we recommend eating utensils made of **Lexan** (a nontoxic, very durable polycarbonate).

Teflon Non-Stick Pans

Potential Adverse Health Effects

Nature, July 19, 2001;412:321-324

Research: David A. Ellis, Department of Chemistry, University of Toronto; Jonathan W. Martin, Department of Environmental Biology, University of Guelph; Derek C.G. Muir, National Water Research Institute, Environment Canada, Burlington, Canada.

Nothing may stick to Teflon, but new research suggests that the byproducts of the heat-resistant coating may be sticking around in the environment for a long time.

Researchers in Canada have discovered that **heating Teflon** -- the coating used in non-stick frying pans -- and other similar compounds **releases potentially harmful chemicals**, including some linked to the destruction of the ozone layer and others that may linger in the environment for years and years.

The precise environmental and health impact of Teflon and similar heat-resistant coatings is uncertain, but the findings suggest that continued use of the compounds **may contribute to the depletion of the ozone layer and global warming.**

After ozone-depleting compounds called chlorofluorocarbons (CFCs) began to be replaced with alternative chemicals called hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), scientists began to notice a rise in levels of trifluoroacetic acid (TFA) in the atmosphere. It turns out that as the alternatives to CFC degrade in the atmosphere, they produce TFA, which persists in the environment over time and can be harmful to plants.

But based on the amount of HFCs and HCFCs being used, Dr. Scott A. Mabury of the University of Toronto and colleagues realized that there was **too much TFA in the environment** to have been produced by these CFC alternatives alone.

Mabury's team suspected that some of the extra TFA in the environment may be produced when Teflon and other so-called fluoropolymers are exposed to high temperatures. Besides Teflon, other fluoropolymers are used in ovens, engines, circuits and other devices exposed to extreme heat.

Heating Teflon and other fluoropolymers produces TFA and a wide range of other chemicals. Some of these include CFCs, which destroy ozone, and fluorocarbons, which may contribute to global warming by **acting as "greenhouse" gases.**

Mabury noted that fluoropolymers also gave off larger versions of TFA that, like the smaller version, do not degrade in the environment. But it is possible that the larger compounds can make their way up the food chain, Mabury explained, since fish can absorb the chemicals from water.

The Toronto scientist stressed that the **findings need to be confirmed** and that the specific amounts of these chemicals released into the environment need to be measured. Although regular-sized TFA does not seem harmful to people, several groups of researchers are investigating **possible health effects** of the larger versions, Mabury said.

Comments from Paul Connett, PhD: Teflon is the trade name for the polymer polytetrafluoroethylene (PTFE) used in electrical insulating tape; combustion engines; chemical apparatus and tubing designed to resist attack from most chemicals, and in non-stick frying pans and other cookware.

Prior to this article there have been stories about caged birds dying in kitchens after fires involving Teflon cookware, suggesting the emissions of toxic gases when this polymer is burned.

This article is more serious because the researchers did not burn the Teflon but simply heated it. Presumably, typical cooking procedures would also heat the Teflon to the temperature range investigated by these researchers. Thus, this material that is perceived by most as

being benign, could be a source of both significant indoor and outdoor air pollution.

This is another nasty indication that the world of organofluorine compounds could be going the same way as their more famous cousins: the organochlorine compounds. In the latter case most of these products, such as organochlorine pesticides, solvents and PVC plastic (despite the toxic generating manufacturing processes that produce them) were perceived as benign.

However, they had several problems:

- They tended to be very persistent in the environment.
- They are fat soluble and resistent to normal detoxification processes in the liver.
- They accumulate and concentrate in animal and human body fat.
- They get passed on by the mother to the fetus through the placental membrane and then to the infant via breast milk.
- A number of them are endocrine disrupting chemicals (i.e. they interfere with the production or performance of hormones, which are the messengers produced in special glands to regulate body chemistry). To top it all, when these substances are burned in any facility ranging from a back yard burner to a trash incinerator, they produce highly toxic byproducts including dioxins and furans (PCDDs and PCDFs).

Twelve of these compounds (or families of compounds) were the subject of the POPs (persistent organic pollutants) treaty signed in Stockholm last May by many countries around the world, including the US. The bottom line is that nature doesn't make persistent things. Both in our bodies and in the environment, natural processes are constantly building up and breaking down all the chemical components used.

Nature attempts to protect itself from persistent fat soluble substances by converting them to water soluble substances, which can then be excreted through the kidney. If this strategy fails then they are stored in our fat. In the case of persistent (or permanent) water soluble

substances like fluoride or lead, the body will excrete as much as it can through the kidney and what it can't ends up largely in our bones.

However, in the case of both fluoride and lead other more sensitive organs like the brain and pineal gland may also have mechanisms which allow their accumulation.

Returning to organofluorine compounds, it is also interesting to note that there are two forms of fluoride found in human plasma: free (or inorganic) fluoride and bound fluoride. According to Gary Whitford in his book, "The Metabolism and Toxicity of Fluoride" (Karger,1996), "perfluorooctanoic acid (PFOA, octanoic acid fully saturated with 15 fluorine atoms) . . . (constitutes) about 20-30% of the nonionic fluoride in human plasma. This surface-active agent, which is a component of plasticizers, lubricants, wetting agents, emulsifiers and other products, appear to enter the body through contact with or ingestion of commercial products. It has a very long half-life (approx. 1.5 years) in human males (Ubel et al., 1980)".

Thus the question raised by this new report in Nature is how many of the byproducts from heating Teflon are accumulating insidiously in our bodies like PFOA? Are any being passed onto the fetus? Will any of them turn out to be endocrine disrupters?

Stainless Steel and Teflon