The Importance of Whole House Filtration

Dying for a bath or shower?

There may be more truth in this statement than intended. Evidence that North Americans are consuming an alarming number of trace toxins in their drinking water was shown in a Boston study which claims you don't even have to swallow the water to be harmed - taking a bath may be worse. Our skin might be a primary means by which we absorb toxic chemicals.

The study, conducted by three toxicologists at the Massachusetts Department of Environmental Quality Engineering (MDEQE), was prompted by a number of telephone calls from people bathing in well water that had been condemned for drinking. "Often, it would be callers who wanted to know if their babies could be affected by the water," says Donna Bishop, a staff toxicologist at MDEQE and an author of the study. "Because no one had really paid attention to that question, we didn't know how to answer."

Bishop and her colleagues began reading everything in print that dealt with toxic chemicals and skin and found much of their evidence in obscure scientific journals. "We didn't expect to find what we did," admits Bishop. "After we studied the literature, it became clear that this is a potential problem area that hasn't been examined by regulatory agencies. *The results were startling.*"

In one of the studies cited, scientists analysed extremely diluted solutions of three common toxic solvents: toluene, methylbenzene and styrene. Although only the subjects' hands were exposed, breath and urine measurements showed that rapid absorption of the chemicals had occurred.

Based on the skin absorption rates derived in the study, the Boston researchers calculated doses to adults and children swimming or bathing in contaminated water and compared these to doses resulting from ingestion at similarly low levels. Absorption by the skin was almost always greater than ingestion, contributing from 29 to 91 percent of the chemicals later excreted, depending on the individual. The average was 64 percent.

"The skin is really the body's largest organ," explains Bishop. "It is an efficient and complex structure, but it's just not able to stand up to the abuse we give it. Once a chemical gets through the outermost layer, the epidermis, there's nothing more to stop it."

Are we all at risk?

Some areas of the epidermis, it turns out, are more permeable than others. For example, the study found that compared with the hand, the scrotum is like a sponge. Other highly absorbent areas include the scalp, the forehead, the abdomen, the underarm, and any wounded or infected skin. Bishop's team also concluded that children, women, and the elderly are the most susceptible. A child's skin is immature and sensitive; women usually have a higher ratio of body fat than men, which tends to aid in the accumulation of chemicals; and the elderly often experience a mild breaking down of the skin that reduces it's efficiency as a barrier. This does not mean, however, that the rest of the population is exempt. All human skin will readily transport toxic chemicals and, under certain conditions, extremely easily.

For instance, dermal cells, when hydrated or warm, expand and their absorption capacity increases. And when the chemicals are very dilute, as they are in domestic water supplies, the process is even more efficient. Finally, when some chemicals are combined with other substances commonly found in household water - like chlorine, chloroform, and even soap - a catalytic effect occurs, speeding the absorption even further.

itdoesthejob.com comment:- Damage to your skin, both through disease or direct environmental influence, can also alter the barrier properties of the skin and enhance absorption of substances. Even something as innocuous as the removal of outer layers of skin with cellophane tape can apparently dramatically increase dermal absorption.

Occlusion (putting a sticky plaster on the area) of skin in contact with a substance also serves to enhance absorption. This phenomenon explains why dressings are placed over topically applied medications in clinical practice. Occlusion serves to increase the hydration and temperature of your skin and can also enhance injury to skin from hazardous substances, thereby increasing absorption, secondarily.

Although Bishop claims that "if the water supply is okay for drinking, it's likely okay for bathing," the challenge is in recognising what actually is "okay." Municipal authorities, EU regulations and government laboratories frequently cite "acceptable" levels of contamination in drinking water, even for carcinogenic substances such as solvents, pesticides, and chlorinated compounds. What they do not consider are the synergistic and mutagenic effects of chemicals acting in combination. Nor can they fully dispute that even the smallest traces of powerful toxins might lead to birth defects or cancer. "With a carcinogen," says Bishop, "no one can say there's a safe level. That's a policy, rather than a scientific fact."

In their summary, Bishop and her co-researchers come to the chilling conclusion that our exposure to toxic chemicals in water is underestimated. "The risk has likely only been calculated for ingestion and not for skin absorption. It's highly possible that people are receiving much larger doses than expected."

The American Chemical Society meeting in Anaheim, CA said in 1986. "People are exposed to more potentially harmful indoor pollutants in the home, office or car than outdoors." A five-year study by the Environmental Protection Agency concurred. Studies by Dr. Julian Andelman, Professor of Water Chemistry, University of Pittsburgh Graduate School of Public Health, found less chemical exposure from drinking chlorine contaminated water than using it to wash the clothes or take a shower.

Dermal absorption (skin penetration)
H.S. Brown, Ph.D.; D.R. Bishop, MPH, and C.A. Rowan, MSPH, report that: "Assessments of drinking water safety rely on the assumption that ingestion represents the principle route of exposure."

Outside of occupational settings, little attention has been paid to skin absorption as a route of entry for volatile organic compounds. Since the mid-sixties, numerous investigators have explored the mechanism of epidermal barrier function in relation to solvents. Although a complex process, dermal uptake of compounds occurs mainly through passive diffusion, involving selective mechanisms in the various lipid & protein structures of the stratum corneum.

The researchers concluded that skin absorption of contaminants in municipal water has been underestimated and that ingestion may not constitute the sole or even primary route of exposure. In addition to penetration of contaminants through the skin to the body as a whole, the contaminants can adversely affect the skin itself. Chlorine chemically bonds with proteins in the hair, skin and scalp. Hair can become rough, brittle and lose colour. Skin can dry out and leave your scalp itchy and flaky. Chlorine can aggravate sensitive areas in the eyes, nose, throat and lungs.

Can I absorb toxins from steam in the shower? Chloroform (a Trihalomethane or THM) and trichloroethylene (TCE) are two highly volatile toxic chemicals that have been identified in your drinking-water supplies. In 1986 The National Academy of Sciences in the USA has estimated that 200 to 1000 people may die in the U.S. each year from cancers caused by ingesting these contaminants in water.

However, the major threat caused by these water pollutants is far more likely to be as air pollutants in the home, according to a study by Dr. Julian Andelman. He found that in the shower when temperature and chemical concentrations increase and the diameter of the shower head hole decreases, volatilisation increases. His data indicates that hot showers (109F) can liberate about 50% of the dissolved chloroform and 80% of the dissolved TCE into the air. Both the heat and the large surface-to-volume ratio of small droplets increase vaporisation. Chlorine, TCE, chloroform, benzene and others are readily absorbed through the lungs into the bloodstream.

One of the most shocking components to all of these studies is that up to 2/3s of our harmful exposure to chlorine is due to inhalation of steam and skin absorption while showering. A warm shower opens up the pores of the skin and allows for accelerated absorption of chlorine and other chemicals in water.

The steam we inhale while showering can contain up to 50 times the level of chemicals than tap water due to the fact that chlorine and most other contaminants vaporise much faster and at a lower temperature than water. Inhalation is a much more harmful means of exposure since the chlorine gas (chloroform) we inhale goes directly into our blood stream. When we drink contaminated water the toxins are partially filtered out by our kidneys and digestive system. Chlorine vapours are known to be a strong irritant to the sensitive tissue and bronchial passages inside our lungs, it was used as a chemical weapon in World War II.

The inhalation of chlorine is a suspected cause of asthma and bronchitis, especially in children, which has increased 300% in the last two decades. “Showering is suspected as the primary cause of elevated levels of chloroform in nearly every home because of chlorine in the water.” Dr Lance Wallace, U.S. Environmental Protection Agency.

Chlorine in shower water also has a very negative cosmetic effect, robbing our skin and hair of moisture and elasticity, resulting in a less vibrant and youthful appearance. Anyone who has ever swam in a chlorinated pool can relate to the harsh effects that chlorine has on the skin and hair. What’s surprising is that we commonly find higher levels of chlorine in our tap water than is recommended safe for swimming pools.

What sort of contaminants are a problem?

The contaminants mentioned in this article are not necessarily in your tap water. However, if chlorine is present in the water it is most certain that other contaminants are also. Chlorine combines with organic substances forming Trihalomethanes including Chloroform. The most common volatile compounds in drinking water supplies as found by the EPA are as listed: trichloroethylene, tetrachloroethylene, carbon tetrachloride, benzene,1,1,1-trichloroethane, 1,2-dichloroethane, ethylene chloride, 1,1dichloroethylene, cis-1,2-dichloroethylene, vinyl chloride, trans-1,2-dichloroethylene, chlorobenzene, dichlorobenzene, & trichlorobenzene.

We conclude that skin absorption of contaminants in shower water has been underestimated and that ingestion (of chlorinated water) may not constitute the sole or even primary route of exposure." American Journal of Public Health, 1984, 74:479-484