

Pink water: plastics, pesticides, and pills are contaminating our drinking supply.

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In September of 2007, the Arctic Monitoring and Assessment Program in Norway released some startling statistics about birthrates in the globe's northernmost reaches. The group found that twice as many girls as boys were being born in some Arctic villages, and that across much of Greenland, Canada, and Russia, a disproportionately high number of female births were occurring. In Sarnia, ON, home of one of the most extensive petrochemical complexes in the world, an unexpectedly large number of girls was also being born, according to Canadian census data. Nearby, a First Nation community had half as many boys as girls.

The accumulation of toxins such as PCBs, flame-retardants, and other artificial chemicals used in electronic equipment has been blamed for the shift in birthrates. These endocrine disruptors are carried by the weather to the Arctic, where they gather in the water and the food chain and concentrate in the bloodstreams of largely meat- and fish-eating communities. Studies of mothers' blood indicated high levels of human hormone mimickers, leading researchers to conclude that man-made chemicals had triggered changes in the sex of unborn children in the first three weeks of gestation.

The Arctic birthrates, while exceptional, are not isolated. Across the globe, the gender balance of the human race appears to be changing. Historically, the number of male births has been slightly higher than the number of female births.

But a 2007 study by the US National Institute of Environmental Health Sciences found that in Japan and the US, there were 250,000 fewer boys than would have been expected had the birth/gender ratio from 1970 remained unchanged.

The exact cause of this shift is unclear. What scientists do know is that estrogen mimickers and endocrine disruptors found in our drinking water supply can have profound effects on humans, interfering with the synthesis, secretion, binding, and action of natural hormones. They affect reproduction, development, and behavior in humans, and can decrease fertility, skew the gender ratio toward female, and feminize genetic males.

[ILLUSTRATION OMITTED]

While North Americans can still boast of having the cleanest drinking water on the planet, big problems have developed with our water supply--and they're not the old concerns about microorganisms or waterborne diseases. This new breed of contaminants is of our own making.

Plastics, Pesticides, and Pills

An Associated Press study released in March of 2008 finds trace amounts of estrogen, as well as more than 50 prescription drugs, in the water sources of 41 million people. The AP discovered that drugs have been detected in the drinking water supplies of 24 major metropolitan areas, from Detroit and Louisville to Southern California and Northern New Jersey. Although most of the levels of the contaminants meet current drinking water guidelines, studies have shown that mutations and sex organ changes in animals still occur at levels far below those limits.

How do these hormones and chemicals enter our water supplies?

Chemicals leaching from plastic are a major source of estrogen compounds in the water supply. Bisphenol A (BPA), a known endocrine disruptor, is a central component in polycarbonate plastics and epoxy resins, and over six billion pounds of it are produced in the US each year. This chemical has been used for decades in the lining of food cans, plastics, baby bottles, and dental fillings.

When plastic is discarded, it doesn't biodegrade; rather, it photodegrades, which means it breaks down under sunlight. When plastic containing BPA photodegrades, it eventually releases estrogen mimickers that can leach into the water supply. When combined with chlorine used to purify municipal water, harmful estrogen-mimicking organ chlorides are also formed. Phthalates, also endocrine disruptors, are another widely used toxic chemical, used primarily to soften otherwise hard plastics. Canada, the US, and several countries in Europe and Asia have already initiated bans on phthalates and BPA, but both chemicals continue to circulate in municipal water supplies.

Dr. Fred Vom Saal, a biologist at the University of Missouri, is an outspoken opponent of the use of BPA. Based on more than three decades of research on the chemical, Vom Saal warns that "putting female sex hormones into a male's body is a really bad idea. You'll see lower sperm levels, male breast development, and changes in fat distribution. In females, you'll observe damaged egg cells, repeated miscarriage, and genetic abnormalities in the embryos."

Other side effects of BPA exposure include obesity, diabetes, early-onset puberty, prostate and breast cancer, hyperactivity, hormonal disruption, neurological damage, ADHD, and autism. Vom Saal adds that the use of plastic is so widespread that BPA levels sufficient to cause these health problems are present in municipal water supplies in every city in America.

Our industrial food system is also to blame for the hormone-mimickers found in our drinking water. For example, the hormones pumped into industrially raised livestock often eventually find their way into municipal water supplies. According to a paper published in the July 2004 issue of Environmental Science & Technology, the US's 10 million cows and 43 million swine excrete a daily mix of 20 to 65 lbs of metabolites of estrogen, likely an order of magnitude higher than what the human population puts out. The hormones are dispensed to the animals to promote growth and to artificially continue lactation in dairy cows. Industrially raised cattle, swine, and poultry are also delivered daily combinations of steroids and antibiotics.

Pesticides are another problem. In a 1997 Residue Monitoring Report, the FDA determined that at least 53 carcinogenic pesticides are routinely applied to American food crops. Some of these,

such as atrazine, have been found to cause gender mutations in amphibians and fish.

As the AP investigation finds, another major source of water contamination is all the pills we pop. The proportion of healthcare spending in North America devoted to prescription drugs, including estrogen-laced birth control pills and hormone replacement therapy, has risen dramatically in recent decades. In the last five years, prescriptions grew by 12 percent. The human body can absorb only some of the medication, and the rest of it passes through and is flushed down the toilet. Discarded medicines often find their way there too.

The AP reports that sex hormones have been detected in San Francisco's drinking water, that the water in Northern New Jersey contains the mood-stabilizing carbamazepine, and that anti-anxiety medications have been found in a portion of Southern California tap water. In Philadelphia, 63 pharmaceuticals or by-products were found in the city's watersheds.

And it's not looking like the "answer to pollution is dilution" theory works. After being ingested, excreted, and flushed down the drain, these drugs are not being filtered out by water treatment facilities. What that means is that people could be getting a small dose of thousands of different drugs with every glass of drinking water. The resulting health implications are just beginning to be realized.

Dr. Jennifer Sass, a senior scientist with the Natural Resources Defense Council (NRDC) in Washington, DC, warns that "anyone drinking tap water in most American cities is essentially taking hormones with their glass of water; and specific populations, including children, people who are pregnant or those with a heart condition, should be especially concerned." She adds that "people should not be reassured by the miniscule levels these drugs are being detected at since they are absolutely within the range of levels where we know they are active in our bodies."

Gender Benders

Scientific studies done on other species have confirmed that the consequences of too many hormone-mimickers in the water can be profound.

For example, the Environmental Protection Agency (EPA) allows atrazine levels of 3 parts per billion (ppb) in our drinking water. Yet University of California research shows that when tadpoles are exposed to atrazine levels of only 0.1 ppb, they develop extra testes or ovaries. Atrazine promotes the conversion of testosterone to estrogen, which explains why male frogs often developed both male and female sexual organs. Scientific studies have shown exposure to low levels of estrogen can cause not only hermaphroditic frogs, but also alligators born with shrunken penises, and frogs with extra legs.

Two years ago, EPA-funded scientists at the University of Colorado studied fish in Boulder Creek, a mountain stream. Of the 123 trout and other fish they netted downstream from the city's sewer plant, 101 were female, 12 were male, and 10 were "intersex" fish with male and female features.

A US Geological Survey team report released in February of 2008 found more evidence of feminized fish. In the Potomac River, seven out of 13 male largemouth bass caught had female characteristics. Some of them were even producing eggs.

Early in 2008, after an exhaustive seven-year research effort, Canadian biologists proved that miniscule amounts of estrogen present in water could decimate wild fish populations downstream. The research, led by University of New Brunswick Professor Dr. Karen Kidd, confirmed that synthetic estrogen used in birth control pills can feminize male fish and cause them to produce female egg proteins.

What this means for humans is uncertain--but there is cause for concern. While men have a small amount of the "female" hormone estrogen, when these levels are elevated due to an outside source such as drinking water, it can lead to serious health consequences, including the onset of feminization.

Waste Not

Sewage wastewater is treated before it is discharged into reservoirs, rivers, or lakes, and the water we drink is cleansed again at treatment plants before it is piped to consumers.

Doug Doyle, senior engineer with the City of Vancouver Waterworks Department, says, "All municipal drinking water systems in North America follow the same American Water Works Association (AWWA) standards." Conventional treatments do not remove many drug or chemicals residues, which is why these endocrine disruptors and hormone mimickers are still showing up in water supplies. Doyle explains that "chlorination remains the most common form of disinfection used, and while ultraviolet light or ozone can also be used, chlorine is favored due to its low cost, effectiveness, and relative safety." The problem is that while chlorine is effective at killing waterborne bacteria and microorganisms and neutralizing effluents, it doesn't eliminate other pharmaceutical chemicals or hormone compounds.

"More sophisticated technology like membrane filtration, activated charcoal/carbon systems, or reverse osmosis is required to do that," Doyle says. "But these energy-intensive and expensive systems are not routinely used in municipal systems." Researchers are looking to new cheaper catalysts and activators and nano-filtration as possible methods to remove these contaminants from wastewater in the future.

Complicating the current effort to remove hormones and chemicals from water supplies is a basic lack of data. Neither the AWWA standards nor the US Safe Drinking Water Act, which regulates drinking water supplies, requires testing for pharmaceutical contaminants, which means that there is not even a clear understanding of the scope of the problem. Of the 62 major water providers contacted by the AP for its investigation, only 28 test for pharmaceuticals and hormones.

Adam Scow with California's Food and Water Watch says that the failure to measure and regulate chemicals in municipal water supplies leads to distrust of the government's ability to guarantee safe water: "When stories come out about problems with tap water, it also promotes the privatization of drinking water and the consumption of bottled water, while we should instead be pressuring government to upgrade existing systems."

The Clean-Up

Around the world, demand for fresh water is starting to outstrip supply. From Atlanta--a major city that relies on a relatively small water supply, the Chattahoochee River--to Las Vegas and Los Angeles which are facing diminishing precipitation due to climate change--communities are

struggling with how to keep the taps running. "Water wars are already brewing or are even at the court level in most of the US," says Noah Hall, executive director of the Great Lakes Environmental Law Center. The diminishing water supplies make the chemical contamination of our water all the more aggravating. We need, as Hall says, to "take care of what we've got."

Some positive changes are underway. Many of the farming methods that pump unwanted drugs into water systems are facing renewed scrutiny, and organic farming is on the rise. Bans on BPA and plastics that leach phthalates are already in place in some countries. But if the contamination continues, and water laced with pharmaceuticals and estrogen chemicals continues to be consumed, our feminized populations may become Severely ill and "reproductively challenged."

Despite that threat, government agencies appear unconcerned with the risk. In April, Benjamin Grumbles, deputy administrator for water with the EPA, told a Senate subcommittee hearing that, "In the absence of reliable data indicating potential risks associated with pharmaceuticals in water at the very low levels at which they have been detected, it would be inappropriate to require monitoring and/or treatment that could carry significant cost, with no evidence of significant risk reduction based on currently available data."

Researchers and environmentalists disagree.

While the effects of most drugs and chemicals are immediate and don't remain in the body like heavy metals do, the effects of repeated exposure do add up. NRDC scientist Sass believes that "the effect of low-level exposure to these hormones may never be measurable, since the penetrance must be very, high in order for epidemiologists to take notice, and it's also very likely that the effects in humans aren't easily detected as many of them are pre-birth.

"There is virtually no research being done on this kind of low-level exposure to pharmaceuticals and estrogen compounds," Sass says. "The only experiment we're doing is the one in the drinking water."

[ILLUSTRATION OMITTED]

What You Can Do to Keep Your Water Drug-Free

Step One: Prevent more contamination

* Stop flushing outdated or unused medication (including those for pets) down the drain. There are programs in place across North America to accept old pharmaceuticals: If your local pharmacy doesn't accept old medication, the EPA advises you contact your state and local waste management authorities. Also, consult your physician to determine which medications can be removed from your regimen.

* For women on hormone replacement therapy or birth control pills, start looking at alternatives to these estrogen-based drugs. Health professionals agree there are often negative side effects to taking estrogen, and there are natural and alternative methods for both birth control and hormone replacement needs.

* Eat less meat and dairy, and eat only organic meat, poultry, and dairy products. Certified organic farming methods do not incorporate the use of hormones, antibiotics, or steroids.

* Reduce or eliminate the use of plastic in your home. Store food and water in glass or stainless steel containers. Choose soups and milk packaged in cardboard "brick" cartons, and if you must use plastic, choose items made with recycling # 2, 4, or 5 plastic only. Remember, cans are lined with plastic too, so choose fresh and local foods when you can.

* Avoid herbicides and pesticides around the house. Check the labels of your hair products, cosmetics, and skin creams and discontinue using those containing placenta, estrogen, estriol, oestradiol.

Step Two: Filter out the contaminants

Once the source of contamination is eliminated, most of the pharmaceuticals and estrogen mimickers discovered in drinking water don't remain in the body for long. A simple carbon filter attached to your tap will be effective in filtering out the harmful contaminants, whether you use well water or a municipal water source. To further filter water, a reverse osmosis system is also recommended. Bottled water is not any safer as there are few EPA regulations governing bottled versus municipal water. Many bottled water plants use tap water as their source and plastic containers for their products.

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