

Drugs in US Drinking Water

10 Mar 2008 Catharine Paddock, PhD

A five month investigation by the Associated Press has discovered that small quantities of drugs, including antibiotics, sex hormones, and anti-seizure compounds, have been found in public drinking water supplied to over 40 million Americans across the US.

While the concentrations are so small they have to be measured in parts per billion or even parts per trillion, and water companies insist these levels are within safety limits, the AP said the long term effects on people's health of so many prescription drugs and over the counter medicines such as acetaminophen (paracetamol) and ibuprofen, even in tiny amounts, are starting to worry scientists.

Drugs and their derivatives get into the drinking water supply because when people on medication go to the toilet they excrete whatever the body does not absorb and any metabolized byproducts. Water companies treat the waste before discharging it into rivers, lakes and reservoirs, and then treat it again before it enters the drinking water system. However, the various treatments don't remove all traces of drugs.

For five months, the AP National Investigative Team visited treatment plants, interviewed over 200 scientists, officials and academics, analyzed federal databases and reviewed hundreds of scientific reports.

Among their enquiries the AP investigators came across research studies that have "gone virtually unnoticed by the general public" where scientists were alarmed at the effect of the drinking water contaminants on human cells and wildlife.

The investigators also found that water companies don't like to publish the results of drug screening tests because they think the public would not know how to interpret them and would become unduly alarmed. However, the US Environmental Protection Agency (EPA) assistant administrator for water, Benjamin H Grumbles told AP that:

"We recognize it is a growing concern and we're taking it very seriously."

The AP investigators discovered that drugs have been found in the drinking water of 24 major metropolitan areas across the country. Here are some of the key findings:

- Southern California: a portion of drinking water that supplies 18.5 million people contained traces of anti-epileptic and anti-anxiety drugs.
- Philadelphia: treated drinking water contained 56 drugs or byproducts, including pharmaceuticals for pain, infection, cholesterol control, heart conditions, asthma.
- San Francisco: a sex hormone was detected in the drinking water.
- Washington DC: six drugs were found in the drinking water supply of the capital and surrounding area.
- Tucson, Arizona: an antibiotic and two other medications were found in the drinking water.
- Northern New Jersey: drinking water for 850,000 residents was found to contain carbamazepine, a mood stabilizer, and a metabolized byproduct of angina medication. This was found by US Geological Survey researchers who analyzed a treatment plant.

The AP report paints a rather chaotic and inconsistent picture of what is happening nationwide, with some water companies testing for a vast range of pharmaceutical compounds and others only testing for two. This is not surprising, since the AP team found that the "federal government doesn't require any testing and hasn't set safety limits for drugs in water".

It is not just waste water that is contaminated. The AP report says that watersheds, the natural source of most of the country's drinking water, are also affected. The AP investigators said tests were carried out in the watersheds of 35 of the 62 major water utilities they surveyed and drugs were found in 28 of them. Six of the 28, when contacted by the AP, said they did not test their drinking water, despite the watersheds being contaminated.

It would seem that no source of drinking water is entirely free of drugs. People who drink water from their own wells may not realize where the water comes from. It could come from a contaminated watershed, like one part of New York City's upstate watershed that tested positive for caffeine, often a marker of other drugs being present. One possible source of contamination for watersheds could be leaky septic tanks, according to one researcher interviewed by the AP team.

Bottled water and home filtration systems are also affected. According to the industry's main trade group, bottlers do not test or treat for pharmaceuticals (and some of these just repackaged tap water said the AP).

Even aquifers, deep underground water systems that supply 40 per cent of the US water demand, are affected. The AP report mentions scientists examined aquifers located near landfill and other potential sources of contamination in 24 states and found traces of

hormones, antibiotics and other drugs.

As more and more people in the world take more and more drugs, and flush them, either unused or after metabolizing them, the concentrations entering the water system goes up. This problem is not confined to the US and the AP report cites evidence from other countries, including lakes in Switzerland and Canada. And it is not just human waste that puts drugs into the water system, but animal waste too, ranging from drugs used to treat domestic pets, to steroids used to treat cattle.

There is already evidence that drugs in the waterways is damaging wildlife, a prime example being male fish that are starting to create egg yolk proteins, a characteristic of female fish.

A large problem appears to be lack of funding to investigate the long term effects of trace amounts of pharmaceuticals, or the disproportionate way that limited funds are being used. The AP team interviewed Shane Snyder, research and development project manager at the Southern Nevada Water Authority, who said:

"I think it's a shame that so much money is going into monitoring to figure out if these things are out there, and so little is being spent on human health."

" It's time for the EPA to step up to the plate and make a statement about the need to study effects, both human and environmental," added Snyder.

Perhaps it is time, suggests the AP, for the focus that is currently maintained on regulated contaminants like pesticides, lead and PCBs, which are present in larger quantities and therefore pose a greater health risk, be extended to include medicines.

Drugs are a unique case because unlike other pollutants, they were designed to act on the human body. The AP team talked to a specialist who has studied trace hormones, heart medicine and other drugs, zoologist John Sumpter of Brunel University, London, who pointed out:

"These are chemicals that are designed to have very specific effects at very low concentrations. That's what pharmaceuticals do. So when they get out to the environment, it should not be a shock to people that they have effects."

It is true to say there is no clear evidence that trace amounts of drugs in the drinking supply are causing us harm, but this is because there have been no long term studies on the combined effects of so many drugs, albeit in trace amounts. Clinical trials of drugs concern themselves with a limited time period and use dosage amounts to test safety and side effects. They don't look at the lifetime effects of trace amounts of the drug, and certainly not in combination with a large number of others.

Sources: Associated Press