

# Pharmaceuticals in Water and Wastewater

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# Emerging Health Concerns



**pharmaceuticals:** N-nitrosodimethylamine (NDMA), 1,4-dioxane, bisphenol A, alkylphenol polyethoxy carboxylates (APECs), dioxin, disinfection by-products, ...



**cosmetics, hormones, nanomaterials**



**endocrine disruptors**, a class of compounds that perturb the normal functioning of endocrine systems including those that affect growth, reproduction and behavior.

**Partial removal requires capital, energy-intensive processes:**

(GAC adsorption; ozonation; micro-, ultra-, nano-filtration; reverse osmosis; membrane bioreactors; advanced oxidation (hydrogen peroxide - UV))

# Pharmaceuticals in drinking water

- Water tested positive for pharmaceuticals
- Water tested negative for pharmaceuticals
- Water not tested for pharmaceuticals
- Test results pending

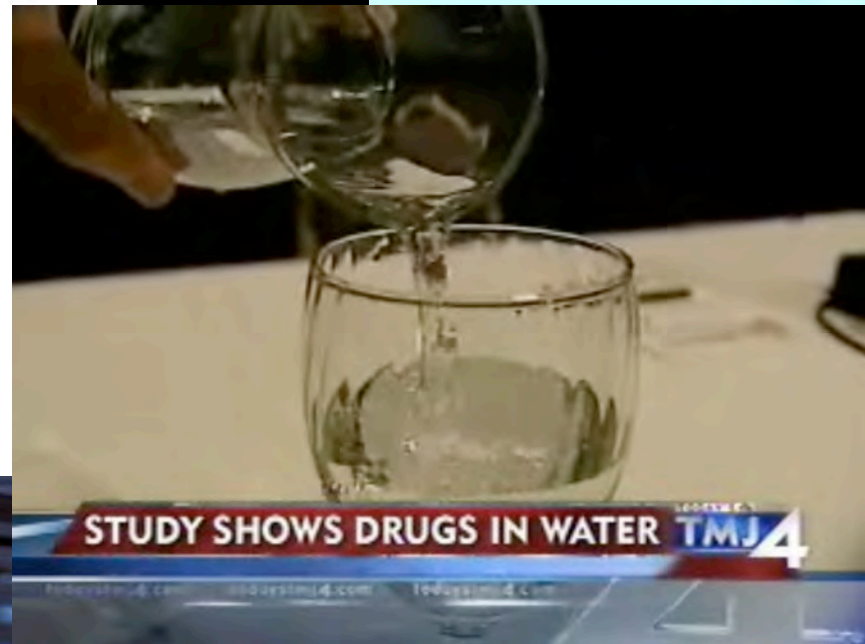


\* In Virginia Beach, pharmaceuticals were found in source water but not in treated drinking water.

\*\* Drinking water in Austin, Texas, was tested for only one prescription drug, a synthetic birth control chemical.

NOTE: All places include some surrounding areas except: Albuquerque, N.M.; Arlington, Texas; Fresno, Calif.; Long Beach, Calif.; Los Angeles; Memphis, Tenn.; New Orleans; New York City; and Orlando, Fla.

# Great Headlines



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# Over-the-Counter Drugs in Drinking Water

Caffeine was found at the highest concentration of all drugs tested by Philadelphia Water

If you drink eight glasses of water a day for more than 1,200 years, you'll get the amount of caffeine in a single cup of coffee (~100 mg)



# Over-the-Counter Drugs in Drinking Water

If you drink eight glasses of water a day for more than 40,000 years, you'll get the amount of acetaminophen in a single infant dose (80 mg) of Tylenol.

There is currently no indication that such extremely low concentrations pose any public health risk.



[www.pharmer.org](http://www.pharmer.org)

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# Recreational Drugs in Wastewater

**Oregon State University** drug-tested influent at 40 wastewater plants:

- [A *"city with a gambling industry"* used five times more methamphetamines
- [A *"fairly affluent community"* scored low for everything except cocaine
- [Cocaine and ecstasy levels peaked on the weekends,  
but the meth and prescription drugs were constant

# Pharmaceuticals

"Ask your doctor if \_\_\_\_\_ is right for you" ...  
take pills ⇒ pee 'em out (& dispose extras) ⇒  
toilet ⇒ wastewater plant ⇒ river ⇒ drinking  
water treatment plant intake ⇒ tap

Concentrations in drinking water are in the  
parts-per-bazillion range.

The real story here is:

- ✓ How amazing the detection methods of modern analytical equipment are.
- ✓ This stuff that we make persists and is incorporated into the environment.



GlaxoSmithKline

