

Thinking About Medicines and Personal Care Products in Drinking Water

The United States has some of the safest public water supplies in the world. Our drinking water is treated and monitored to assure that the water being delivered is safe for consumption. While our water is safe, drinking water quality and management is understandably complicated. Small traces of naturally occurring or human-made substances can sometimes find their way into tap water. Some of these substances are medicines and personal care products.

What are medicines and personal care products?

Medicines are compounds used for treatment of diseases. Personal care products are intended to be used by consumers for application on the body.ⁱ Examples of medicines and personal care products detected in water include antimicrobial materials found in toothpastes and hand soaps, fragrances, prescription medicines, bug sprays, and sunscreen. Concentrations of these substances detected in water are typically very smallⁱⁱ and are currently not regulated at the federal level in the United States.

How do medicines and personal care products enter the water system?

Examples as to how these substances enter wastewater include: excretion after ingestion, disposal of unused medicines in sinks or toilets, or personal care products washed from our hair and skin. Depending on the type of treatment, some of these can remain even after the wastewater is treated. Medicines also may be present in run-off water from livestock operations, dairies, poultry farms, and aquaculture facilities; and may be present in discharges from pharmaceutical manufacturing facilities and hospitals.ⁱⁱⁱ The treated wastewater and the runoff can enter streams or groundwater that are a source of drinking water supply. Of course, minute amounts of these substances also enter rivers and streams that are used as a source of drinking water when people who are using products such as sunscreens and skin creams swim or bathe in the water.

What are the concerns about medicines and personal care products in water?

A great deal is known about the physiological effects of medicines for target populations in light of the rigorous process by which they are developed and approved. The degree to which a person might be exposed through drinking water would be very small in comparison to the dose one would normally expect to receive by taking medicine or applying personal care products directly to the body. In other words, if a person wanted a therapeutic dose of a medicine such as to cure headache pain, you would need to drink on the order of 100,000,000 glasses of water to obtain a therapeutic dose. At this time, no definitive links have been established between medicines and personal care product exposure through drinking water and risks to human health^{iv} and there is no established federal regulation.



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Nevertheless research and investigations continue by the government and water treatment agencies in the interest of safety.

What treatment approaches exist for medicines and personal care products in water?

Medicines and personal care products can be removed or reduced through advanced treatment technologies. However, regulatory bodies have not found any evidence to support requiring additional or specialized treatment to remove them from drinking water.^v Proper disposal of unused medications, land use management to prevent runoff into streams and rivers, and other activities to protect our sources of drinking water will help.

Source of Information

This information is based on detailed technical information prepared by Dr. Shane Snyder. Dr. Snyder is a Professor of Chemical & Environmental Engineering, and holds joint appointments in the College of Agriculture and School of Public Health, at the University of Arizona. He also co-directs the Arizona Laboratory for Emerging Contaminants (ALEC) and the Water & Energy Sustainable Technology (WEST) Center. For nearly 20 years, Dr. Snyder's research has focused on the identification, fate, and health relevance of emerging water pollutants. Dr. Snyder has been invited to brief the Congress of the United States on three occasions on emerging issues in water quality. He has served on several EPA expert panels and is currently a member of the EPA's Science Advisory Board drinking water committee. He was recently appointed to the World Health Organization's Drinking Water Advisory Panel.



ⁱ Daughton, C.G., and T.A. Ternes. (1999). Pharmaceuticals and personal care products in the environment: agents of subtle change? *Environmental Health Perspectives* 107(Supplement 6): 907-938. <http://www.epa.gov/esd/bios/daughton/errata.pdf>

ⁱⁱ DWI. (2007). *Desk Based Review of Current Knowledge on Pharmaceuticals in Drinking Water and Estimation of Potential Levels*. November 2007. Final report prepared by Watts and Crane Associates for Drinking Water Inspectorate (DWI), Department for Environment, Food and Rural Affairs (London). (Defra Project Code: CSA 7184/WT02046/DWI70/2/213). <http://dwi.defra.gov.uk/research/completed-research/reports/dwi70-2-213.pdf>

ⁱⁱⁱ Daughton, C.G., and T.A. Ternes. (1999). Pharmaceuticals and personal care products in the environment: agents of subtle change? *Environmental Health Perspectives* 107(Supplement 6): 907-938. <http://www.epa.gov/esd/bios/daughton/errata.pdf>

^{iv} NHMRC. (2013). *Australian Drinking Water Guidelines (2011) - Updated December 2013*. Canberra, ACT, Australia: National Health and Medical Research Council (NHMRC). <https://www.nhmrc.gov.au/guidelines/publications/eh52>

^v NHMRC. (2013). *Australian Drinking Water Guidelines (2011) - Updated December 2013*. Canberra, ACT, Australia: National Health and Medical Research Council (NHMRC). <https://www.nhmrc.gov.au/guidelines/publications/eh52>

