Traces of pharmaceuticals found in central Indiana waterways

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(PhysOrg.com) -- Pharmaceuticals have been found in freshwater ecosystems in rural areas of central Indiana, says a new study from Ball State University.

Analysis of water collected in the last year from 10 streams in the upper White River watershed found trace amounts of acetaminophen, caffeine, dimethylxanthine, a byproduct of caffeine, and cotinine, a byproduct of nicotine.

"Like it or not, we may be unintentionally exposed to drugs from our drinking water if pharmaceuticals are in our freshwater sources," said Melody Bernot, a Ball State biology professor. "In some spots, we found traces of the mood-altering drug lithium. There are more than 300 pharmaceuticals that are being passed by human excretion into our sewer systems, and our current wastewater filtering systems are not eliminating them before the drugs enter our streams and rivers."

The presence of these compounds in freshwater ecosystems and drinking water supplies raises potential health issues, but little is known about the how these compounds could impact humans through chronic exposure, Bernot said.

"At this point, I can't say if it dangerous or not to consume trace amounts," she said. "The federal government only recently began funding this research."

Bernot plans to apply for funding to continue and expand her research, not only examining the impact on humans but also aquatic animals.

She said pharmaceutical compounds are designed to have a physiological effect on humans or animals, and it is likely that they may also alter function of aquatic organisms. Few studies have examined the influence of pharmaceutical compounds on freshwater organisms.

The report pointed out that sewage contamination is the main pathway for human pharmaceuticals to enter streams. This can be a result of many factors, including age and design of the sewer system. Less urbanized areas tend to use more septic tanks, as opposed to more advanced sewer systems, that can leak untreated sewage into streams.

"This study suggests these sources are contributing pharmaceuticals to streams," Bernot said. "Urbanized areas tend to have updated sewage systems that carry waste to treatment facilities making contamination in streams not receiving wastewater treatment more apparent, especially during conditions when combined sewer overflows are not contributing to water flow."

"We also have many animal feeding operations in central Indiana. Whatever drugs veterinarians put into the animals are eventually excreted into the fields and potentially exported to freshwater."

Bernot initiated the study to better understand the distribution of pharmaceuticals and their potential effect on stream processes. Prescription and nonprescription pharmaceutical concentrations were measured in headwater streams not directly receiving wastewater treatment water in the upper White River watershed.

The area has the one of the most urbanized watersheds in Indiana, encompassing three metropolitan areas including Indianapolis, Anderson

and Muncie. The watershed includes 16 counties and supplies 85 percent of the surface water needed for human use in Indianapolis and central Indiana.

Provided by Ball State University