

Drugs and chemicals at alarmingly high levels in Great Lakes, study shows

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Ken Schiffer dives into Lake Michigan in Chicago, July 31, 2006. Photo: REUTERS/Frank Polich

DETROIT — According to a recent study, the Great Lakes are in worse shape than previously realized. Pharmaceuticals — that is, medicinal drugs — caffeine and items such as toothpaste additives have been found farther out in the water than ever before. And they have been detected in worryingly high levels.

The disturbing new study was released last month. It was the first to thoroughly test for the presence of pharmaceuticals and personal care products — or PPCPs — within the Great Lakes.

Professor Rebecca Klaper, who co-authored the study, said she was surprised by its findings. She and the other researchers had expected that the PPCPs would be undetectable because of the Great Lakes' huge volumes of water. Lakes Michigan and Huron, for example, together have 2 quadrillion, or 2,000 trillion, gallons of water. The two lakes are connected.

Pharmaceuticals found in Lake Michigan two miles offshore included a diabetes medication and a hormone used in birth-control pills. The new findings are alarming researchers, who are now learning more about the dangers of PPCPs. The concern is that the products might harm fish and other aquatic life, Klaper said.

Health Threat To Great Lakes

If they are causing damage, Klaper said, we'll need to try to get rid of them through water treatment.

Klaper and her team looked for 54 PPCPs and hormones in Lake Michigan. Testing was done over two years at varying distances from Milwaukee's two main wastewater treatment plants. Such plants are supposed to clean up wastewater — that is, water from sewer pipes feeding into the lake. Because sewage contains a lot of feces and urine, it also contains a lot of the chemicals humans take in. These can come from everything from soda to medicine.

Thirty-two of the PPCPs were found in Lake Michigan's water and 30 in the lake's sediments — that is, its mud. The most frequently found products were detected as far out as two miles from the wastewater treatment plants. These included:

—Metformin, a diabetes medicine.

—Caffeine, which is found in coffee, tea, soda and energy drinks.

—Sulfamethoxazole, which is used to treat conditions such as urinary tract infections and inner-ear infections.

—Triclosan, which is added to many products, including toothpaste and soaps.

Fourteen of the PPCPs were found in concentrations that had a medium or high ecological risk.

"The concentrations found in this study ... indicate a significant threat by PPCPs to the health of the Great Lakes," the research report states. The threat is particularly severe for plants, fish, and animals near the shore.

"Exposed To A Chemical Soup"

While only Lake Michigan was studied, PPCPs most likely are also building up in other Great Lakes, according to Klaper.

It's alarming that the chemicals were found that far from shore, said Olga Lyandres, who works for the Alliance for the Great Lakes.

People always knew that you had check for PPCPs right near where treated water was being emptied into the lake, she said. But it was assumed that because the lake is so large, PPCPs couldn't be "affecting the lake as a whole."

The number and variety of PPCPs found is also making people worried, Lyandres said.

“There are some questions that are still unanswered,” she said. “You can study one chemical at a time, but in reality, we’re exposed to a chemical soup.”

Another study led by Klaper last year revealed some of the damage that may be being caused by PPCPs. The study exposed fathead minnows to low levels of two PPCPs commonly found in water: linuron and DEHP. Male minnows exposed to a mix of the chemicals had reduced levels of testosterone, a hormone needed for reproduction. This was not the case, however, when they were exposed to either one of the chemicals alone.

Water Treatment Doesn't Fully Remove PPCPs

PPCPs are widely considered potentially harmful. But not much is known about what effect very low levels may have. This has meant that little to nothing is done about them when it comes to water treatment.

“We don’t do anything specific for them,” said Dave Johnson of the Muskegon Wastewater Management System. “We have our treatment that’s in place” for sewage “and that’s all they get.”

The Muskegon plant treats water for the city and surrounding areas. In 2010, Johnson said, it conducted a study of PPCPs in water coming into the plant and flowing out. The study showed wastewater treatment did not fully remove a number of products. These included the painkillers acetaminophen and ibuprofen, and the anesthetic lidocaine. Tests also found traces of sucralose, a sweetener sold under the brand name Splenda.

“That’s why it’s a very good dietary sweetener; it doesn’t break down very well and you don’t get the calories from it,” Johnson said. “But it works the same way at the wastewater treatment plant — the bacteria isn’t able to break it down.”

There are new treatment technologies that can remove low levels of PPCPs. But, Johnson said, only the newest plants have them. And remodeling older plants can be extremely expensive. Wastewater treatment officials will “definitely wait and see” what scientists come up with before doing any expensive remodeling, he said.

Researchers should now concentrate on figuring out which PPCPs are the most important to remove, Klaper said. And also, how best to remove them.

Quiz

- 1 Select the paragraph from the article that shows the reason why Professor Klaper expected the PPCPs would be untraceable.

- 2 How far from shore were pharmaceuticals detected?
 - (A) 2 feet
 - (B) 54 feet
 - (C) 2 miles
 - (D) 30 miles

- 3 Water treatment plants are unable to fully remove the PPCPs from the water for all of the following reasons, EXCEPT:
 - (A) The water treatment chemicals are unable to completely break down the PPCPs.
 - (B) Most treatment plants do not have the treatment technologies to remove PPCPs.
 - (C) The lake is too large to completely remove all the PPCPs that it currently contains.
 - (D) Remodeling treatment plants with the latest water treatment technology is expensive.

- 4 According to the article, the concentration of PPCPs in the water indicates a significant threat to all of the following, EXCEPT:
 - (A) animals
 - (B) fish
 - (C) humans
 - (D) plants