

Study investigates the presence of contaminants on drinking water

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Cassiana Montagner, professor at the Institute of Chemistry and head of the Environmental Chemistry Laboratory of the University of Campinas, during FAPESP Week Nebraska-Texas. Credit: Heitor Shimizu / Agência FAPESP

Brazilian and American scientists are attempting to determine emerging contaminants in the environment based on the comparison of water and sewage treatment systems in each country. They are collecting samples

from a wide variety of sources such as surface water, groundwater, wastewater, reuse water, sewage water and residential drinking water.

According to Cassiana Montagner, a professor at the Institute of Chemistry and head of the Environmental Chemistry Laboratory of the University of Campinas (UNICAMP) in São Paulo, Brazil, the presence of contaminants has been identified in drinking water, although at much lower levels than in groundwater or alternative sources of supply.

"Compared to the United States, sanitation conditions in Brazil are quite precarious. Conventional wastewater treatment systems in Brazilian cities are not efficient at removing most of the emerging contaminants, such as bisphenol, used in the production of plastics," she said. "The results of our studies indicate that some of the water treatments used in Brazil, if done properly, could remove a portion of these contaminants, but complementary treatments need to be adopted in order to obtain clean water that can be safely consumed."

Hundreds of contaminants can be found in the water used by the population. Researchers focused on a list of compounds of mutual interest, sufficient in number to identify contamination in the source analyzed. "Analysis of the presence of these compounds can indicate the level of contamination of the water system by sewage. It is also an indication that the [water treatment](#) stations are not efficiently removing emerging contaminants," Montagner said.

Montagner verified the presence of industrial compounds, pesticides, personal hygiene products, medicines, caffeine and illegal drugs, among other things. "The compounds are being isolated, identified and quantified using liquid chromatography coupled with mass spectrometry."

Hormones comprise one of the emerging contaminants identified by the

group. "Some of these compounds are what are known as endocrine disruptors, because they could have an adverse effect on our endocrine system," Montagner said.

The endocrine system consists of the set of glands responsible for the production of hormones. Some compounds discharged by humans into the environment have the potential to deregulate the endocrine system of humans and other animals. It is suspected that this can affect the reproductive [system](#) and cause disease.

In June of 2017, Montagner, Klein and their colleagues published their findings in an article titled "Biophysical Viscosity: Thermodynamic Principles of Per Capita Chemical Potentials in Human Populations" in *ACS Omega*. The article points out that population density is not the only factor involved in determining the flux of [contaminants](#), and that the biophysical viscosity—the resistance of a region to molecular flow under environmental force—is a useful tool in determining the per capita chemical potential of anthropogenic chemical [compounds](#) for environmental risk assessments.

More information: R. P. Oates et al. Biophysical Viscosity: Thermodynamic Principles of Per Capita Chemical Potentials in Human Populations, *ACS Omega* (2017). [DOI: 10.1021/acsomega.7b00613](https://doi.org/10.1021/acsomega.7b00613)

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