

# **Hypertension and cholesterol medications present in water released into the St. Lawrence River**

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A study conducted by Université de Montréal researchers on downstream and upstream water from the Montreal wastewater treatment plant has revealed the presence of chemotherapy products and certain hypertension and cholesterol medications.

Bezafibrate (cholesterol reducing medication), enalapril (hypertension medication), methotrexate and cyclophosphamide (two products used in the treatment of certain cancers) have all been detected in wastewater entering the Montreal treatment station. However, only bezafibrate and enalapril have been detected in the treated water leaving the wastewater treatment plant and in the surface water of the St. Lawrence River, where the treated wastewater is released.

This study was conducted due to the sharp rise in drug consumption over the past few years. In 1999, according to a study by IMS Health Global Services, world drug consumption amounted to \$342 billion. In 2006 that figure doubled to \$643 billion. A significant proportion of the drugs consumed are excreted by the human body in urine and end up in municipal wastewater. Chemotherapy products, such as methotrexate, are excreted by the body practically unchanged (80 to 90 percent in their initial form).

## **Chemotherapy for fish?**

The pharmaceutical compounds studied were chosen because of the large quantities prescribed by physicians. "Methotrexate and cyclophosphamide are two products very often used to treat cancer and are more likely to be found in water," says Sébastien Sauvé, a professor of environmental chemistry at the Université de Montréal. "Even though they treat cancer, these two products are highly toxic. This is why we wanted to know the extent to which the fauna and flora of the St. Lawrence are exposed to them."

## **Method and quantities**

Professor Sauvé's team validated a rapid detection method (On-line SPE-LC-MS/MS ) for pharmaceutical compounds under study in the raw and treated wastewater of the Montreal wastewater treatment plant.

The quantities of bezafibrate and enalapril detected in the raw wastewater, treated wastewater and surface water at the treatment station outlet are respectively 50 nanograms per litre, 35 ng L and 8 ng L for bezafibrate and 280 ng L, 240 ng L and 39ng L for enalapril.

"All in all, these quantities are minimal, yet we don't yet know their effects on the fauna and flora of the St. Lawrence," Professor Sauvé explains. "It is possible that some species are sensitive to them. Other ecotoxicological studies will be necessary. As for the chemotherapy products detected in the raw wastewater but not in the treated wastewater, one question remains: did we not detect them because the treatment process succeeded in eliminating them or because our detection method is not yet sophisticated enough to detect them?"

## **A new threat to the aquatic environment**

The release locations of wastewaters treated by the treatment stations are

the main source of drug dispersion into the environment. Because of their high polarity and their acid-base character, some of the pharmaceutical compounds studied have the potential to be transported and dispersed widely in the aquatic environment. In Montreal, the wastewater treatment station treats a water volume representing 50 percent of the water treated in Quebec and has a capacity of about 7.6 million cubic metres per day, making it the largest physicochemical treatment station in the Americas. This is why it is important to develop a simple, rapid, precise and inexpensive method, Professor Sauvé points out.

Source: University of Montreal

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