

Researcher studies drug-resistant bacteria in environment

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Lesley Warren, associate professor in the School of Geography & Earth Sciences. Photo by Susan Bubak.

Water is essential to life, but the water we drink to stay alive could also be making us sick. Lesley Warren, associate professor in the School of Geography & Earth Sciences, is studying the interaction between water, rocks and bacteria that can have a negative impact on human and environmental health.

"Environmental water quality and public health are inextricably linked," said Warren.

She is currently studying the link between antibiotic resistance in environmental bacteria and water quality. Bacteria have been around for 3.5 billion years, and they have learned how to survive by adapting to their environment, Warren explained. However, when bacteria develop resistance to contaminants in their environment, such as heavy metals, that resistance often works against antibiotics.

Environmental bacteria are also directly exposed to drugs through treated water discharges and agricultural runoff, which can lead to resistance.

A recent investigation by the Associated Press

found trace amounts of various pharmaceuticals, including antibiotics, painkillers and hormones, in drinking water supplied to a number of American cities. The quantities of drugs were so miniscule, they passed through water treatment facilities. Once bacteria develop resistance to a particular drug, they pass on the resistance to their siblings, offspring and other bacteria.

Last summer, in a pilot study supported by McMaster's Collaborations for Health, Warren and colleagues Christian Baron (Biology) and Padman Jayaratne (Pathology and Molecular Medicine), collected bacteria samples from Toronto's Sunnyside beach and found them to be resistant to antibiotics. But developing new, more powerful drugs isn't the answer.

"You're never going to stop resistance," said Warren. "It's a natural process. Looking for new drugs is a race we're not winning." By understanding how and when resistance is triggered by environmental conditions, researchers can develop more effective early warning indicators and provide new ideas for therapeutic strategies to combat infectious diseases.

Warren is leading an NSERC Strategic Project that includes Gerry Wright, director of the Michael G. DeGroote Institute for Infectious Disease Research, researchers from other universities, Environment Canada, a team of graduate and undergraduate students, as well as public health officers in Hamilton and Toronto to develop an early warning system that would identify when environmental conditions are ripe for developing drug-resistant bacteria that could pose a threat to human health.

In one of the first environmental surveillance studies for the province, the group will start evaluating both water quality and the occurrence of antibiotic resistance in bacteria in water bodies around Ontario this summer.

Source: McMaster University

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