Pollution with antibiotics leads to resistant bacteria

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Many of the substances in our most common medicines are manufactured in India. Some of these factories release huge quantities of drugs to the environment. Swedish scientists now show that bacteria in polluted rivers become resistant to a range of antibiotics. International experts fear that this may contribute to the development of untreatable infectious diseases world-wide.

The study was carried out at the Sahlgrenska Academy, University of Gothenburg in collaboration with Chalmers University of Technology and Umeå University, Sweden, in which researchers Jerker Fick and Hanna Söderström from the Department of Chemistry are co-authors.

Using a novel method, based on large-scale DNA sequencing, the Swedish scientists show that bacteria residing in Indian rivers are full of resistance genes, protecting them from otherwise effective antibiotics.

“Since we buy medicines from India, we share moral responsibility to reduce the pollution, says Joakim Larsson,” associate professor at the Sahlgrenska Academy, University of Gothenburg, one of the scientists behind the study.

“If the pollution contributes to resistance development in clinically important bacteria, it becomes our problem also in a very direct way,” he says.
“We have combined large-scale DNA sequencing with novel ways to analyze data to be able to search for thousands of different antibiotic

resistance genes in parallel," says Erik Kristiansson, assistant professor at Chalmers University of Technology.

"Such an approach may become useful also in hospitals in the future," he points out.

Several international experts, interviewed by the journal *Nature*, describe the results as worrying. "Even if the bacteria found are not dangerous to humans or other animals in the area, they may transfer their resistance genes to bacteria that are," says Dave Ussery, a microbiologist at the Technical University of Denmark.

David Graham at Newcastle University, UK, describes the Indian site.

"In a way, it's sort of like a beaker experiment that tests the worst-case scenario, only this is in a natural system."

Björn Olsen, an infectious-disease specialist at Uppsala University in Sweden compares the resistance with volcano-ash. "The cloud is going to drop down somewhere else, not just around the sewage plant."

More information: Pyrosequencing of antibiotic-contaminated river sediments reveals high levels of resistance and gene transfer elements, by Erik Kristiansson, PLoS ONE. dx.plos.org/10.1371/journal.pone.0017038

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