Preparing for Tamiflu-resistant influenza viruses

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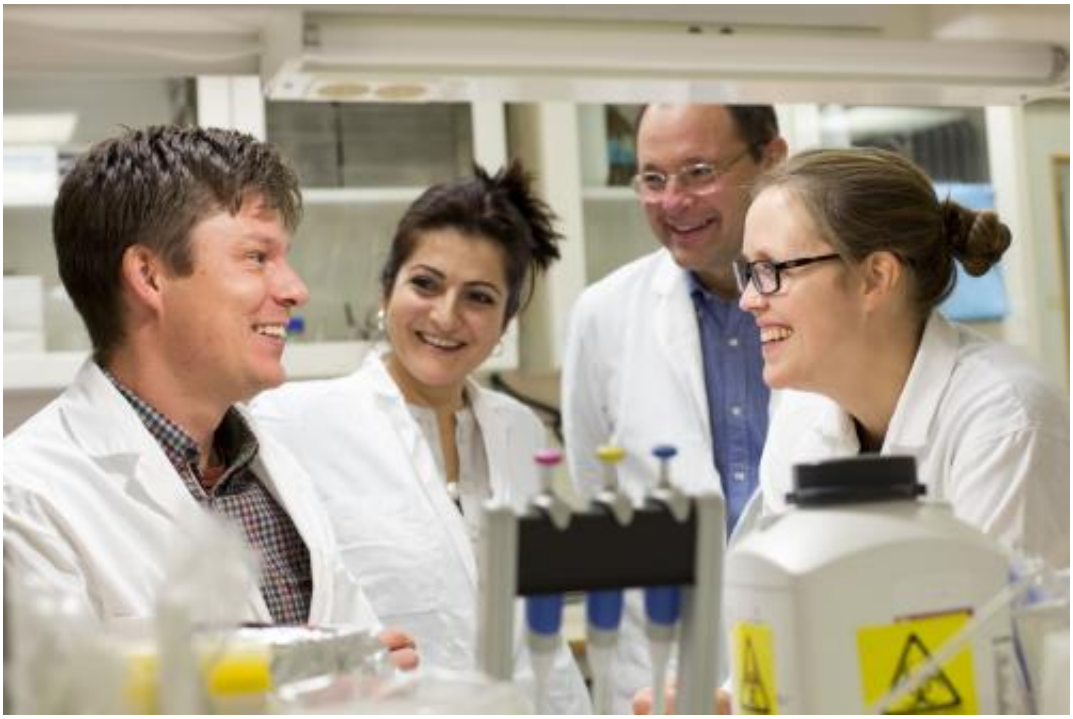

From left: Josef Järhult, Shaman Muradrasoli, Björn Olsen and Hanna Söderström.

Researchers in Umeå and Uppsala have found that residues of the influenza drug Tamiflu in our environment can make the influenza virus in birds resistant. This can have serious consequences in the event of an influenza pandemic. With more than 14 million SEK from the Swedish Research Councils Formas and VR, the research team will now continue

their studies with a focus on alternative antiviral drugs.

Influenza is a viral respiratory infection that spreads rapidly and cause widespread epidemics. A severe influenza pandemic is a major health problem and treatment with antiviral medications is a central part of the preparedness plan. Tamiflu is the most widely used drug.

Hanna Söderström, environmental chemist and researcher at Umeå University and Josef Järhult, infectious disease physician and researcher at Uppsala University, together with Björn Olsen, professor at Uppsala University and Shaman Muradrasoli, researchers at SLU, Uppsala, have with a multidisciplinary approach followed what happens if Tamiflu comes out in nature.

"Our results show that Tamiflu's active metabolite, secreted by human urine, is not removed in traditional wastewater treatment plants. We have been able to trace Tamiflu in river water in Japan during the flu season 2007/ 08 as well as in Europe during the influenza pandemic 2009. Japan is the country that uses most antiviral drugs in the world during seasonal flu," says Hanna Söderström.

Based on the fact that dabbling ducks are the natural host for influenza viruses and that they often swim near the treatment plants, the researchers have examined whether influenza viruses in ducks exposed to Tamiflu via their bath and drinking water develops resistance.

"When ducks swim in water with environmentally relevant concentrations their influenza virus develop resistance. If a resistant influenza virus is spread to humans and causes a pandemic, this is a serious threat to public health since it takes many months to produce vaccine. We are therefore referred to the use of antiviral drugs during a pandemic´s first wave," says Josef Järhult.

Today, Relenza is the drug that constitutes the first hand option when Tamiflu has no effect. It is therefore very likely that Relenza, and new antiviral drugs that are not yet out on the Swedish market, will be used more if the Tamiflu resistance increase.

With the money that the research group will receive they want to be one step ahead and develop a national knowledge center on effects of antiviral drug in the environment and the risk of development of resistant viruses.

"It is particularly important to examine the risk of resistance development before the drug is used more extensively so that we can adjust the prescription and implementation of a sound preparedness planning for future pandemics," says Josef Järhult.

Another part of the research focuses on better waste water treatment. Ozone treatment has proven to be an effective method for treating waste water containing Tamiflu and the researchers will investigate whether the method can work for other antiviral drugs as well.

The research group is part of the "One Health Sweden" – a network of researchers from different disciplines who study infectious diseases through intensive collaboration and with a holistic approach.

Provided by Umea University