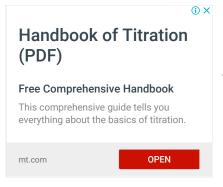


DETECTION OF PHARMACEUTICALS AND PHYTOCHEMICALS TOGETHER WITH THEIR METABOLITES IN HOSPITAL EFFLUENTS IN JAPAN, AND THEIR CONTRIBUTION TO SEWAGE TREATMENT PLANT INFLUENTS



Recently, an emerging problem of pollution of river environment by pharmaceuticals has begun to receive a large amount of attention worldwide. Research for the occurrence and fate of these contaminants in the river environment and sewage treatment plants (STPs), and including environmental risk assessments have triggered anxiety regarding the potential appearance of drugresistant microorganisms in the water

environment.

Pharmaceuticals are designed to have specific physiological effects on targeted body areas, they have high polarity to make them easily discharged from the body. As a result, they tend not to be removed during the traditional sewage treatment process. In addition, pharmaceuticals are used constantly in hospitals to treat disease. Therefore, evaluation of the occurrence of pharmaceuticals in hospital effluents, and of the development of advanced water treatment systems have been begun to reported mainly from Europe and the United States.

Group of eminent scientists, **Dr. Takashi Azuma and his team** from Osaka University of Pharmaceutical Sciences, Japan, investigated on "Detection of pharmaceuticals and phytochemicals together with their metabolites in hospital effluents in Japan and their contribution to sewage treatment plant influents". The quantity of pharmaceuticals used in Japan is the second largest in the world after that used by the United States. The coverage of sewerage systems is high in Japan (more than 90% of urban areas), and both domestic waste and hospital effluent are transferred into sewerage systems. Nevertheless, no study has yet surveyed pharmaceuticals in hospital effluents in Japan for now, and their occurrence and contribution to STP influents are mostly unknown.

Given these situations, **Dr. Takashi Azuma and his team** conducted a year-round survey for pollution status of 41 pharmaceuticals and phytochemicals grouped into 9 therapeutic classes together with their active metabolites in hospital effluent in an urban area of Japan. In addition, a similar survey was conducted for STP that treated sewage from the targeted hospital and surrounding households and river water to achieve comprehensive understandings of the environmental fate of pharmaceuticals in the water environment.

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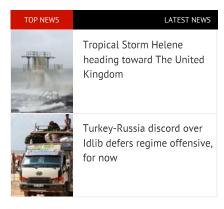
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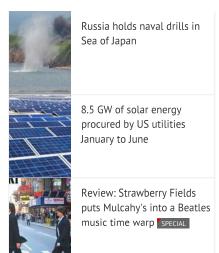
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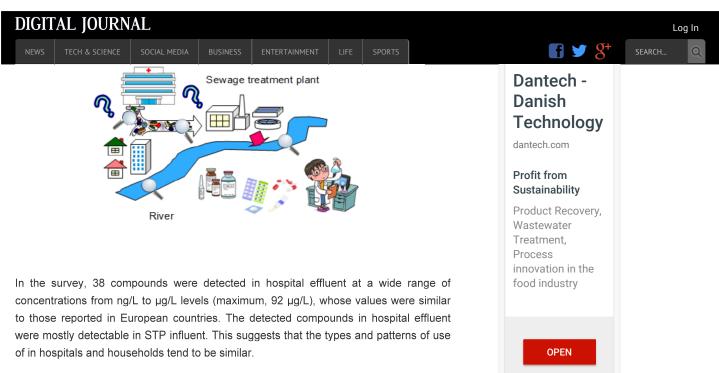


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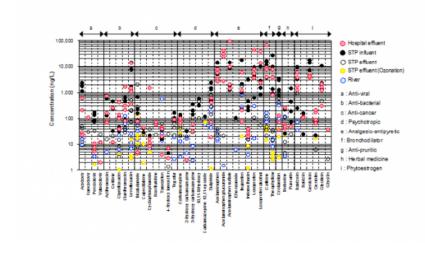








The concentrations of pharmaceuticals detected in STP effluent and river water was kept mostly at the same level. The contribution of pharmaceuticals originating from hospital effluent to STP and then to the river environment showed a broad contribution (<0.1% to 14.8% for STP and several % to 177% for the river environment) profiles that varied depending on the class of pharmaceuticals. These results indicated that many pharmaceuticals were recalcitrant to conventional water treatment systems centered on biological treatment systems. However, after ozone treatment at STP, mean concentrations of all targeted compounds decreased to the range from N.D. to several tens of ng/L, which were roughly one-tenth to one-hundredth of the concentrations detected in STP effluent with chlorination after biological treatment.



So then, the present research noted that to remove these recal citrant chemicals, not only the introduction of advanced wastewater treatment systems at STPs but also at medical facilities is essential to minimize the degree of environmental pollution posed by the use of pharmaceuticals and ensure the safety of the water environment. Further research that expands the number of target hospitals to clarify the occurrence and pollution load of pharmaceuticals in hospital effluents is required in the future, together with the development of an innovative water treatment systems.

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