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2020.07.20

Professor Yunho Lee's team detects antiepileptic drugs in drinking water and investigates structural changes during the water treatment process

- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Earth Sciences and Environmental Engineering Professor Yunho Lee's team along with the Busan Water Quality Research Institute has discovered for the first time that a drug called 'Gabapentin'* exists in Korea's drinking water, and it can be converted into a byproduct with toxic potential during the chlorine water treatment process and found in tap water.

* Gabapentin: It is widely used as an epileptic drug and is frequently detected in domestic and foreign sewage and water sources.

- There are various kinds of synthetic organic compounds in drinking water sources, such as rivers, and the possibility that some of these compounds can be converted into toxic by-products during water treatment has been continuously raised.
- The research team detected extensive anti-epileptic drugs called 'Gabapentin' in sewage effluent and water from the Nakdong River basin in Korea and confirmed that domestic sewage discharge is the main source of 'Gabapentin.'
 - 'Gabapentin' was also detected in the water purification plant located downstream of the Nakdonggang River, and during chlorine water treatment,

it was confirmed that 'Gabapentin' was converted to other substances within a short time.

- The research team first identified that the amine agent of 'Gabapentin' reacts quickly with chlorine and converts it into a nitrile functional group*. The produced Gabapentin-nitrile** by-product is mostly removed in the subsequent water purification process of the plant. Its concentration has been reduced to a harmless level, but it requires constant management.

* nitrile functional group: A functional group consisting of a triple bond between carbon and nitrogen, which breaks down into cyanide ions when absorbed in the body, and a typical example is cyanide.

** Gabapentin-nitrile: Gabapentin's amine functional group is a by-product converted to a nitrile functional group, which has a nitrile functional group, but is unlikely to decompose into cyanide ions in the body and requires further toxicity studies.

- Professor Yunho Lee said, "The results of this research have the greatest significance in confirming that the commonly used medicines and artificial synthetic compounds can be converted in the water treatment process and affect the water quality of drinking water. We hope that continuous management measures will be devised through follow-up research on how to move and transform even small amounts of pollutants in the water."
- This study was led by Professor Yunho Lee and was conducted by Ph.D. student Jiwoon Ra as first-author. Dr. Hoonsik Yoom and Dr. Heejong Son of the Busan Water Quality Institute, an organization specializing in water quality management, analyzed and monitored trace amounts of pollutants on samples from sewage treatment plants, rivers and drinking water treatment plants in the Nakdong River basin.
- This research was supported by the Korea Environment Industry & Technology Institute through the 'development of target/suspect/nontarget screening method for analysis of micropollutants and unknown substances' funded by Korea Ministry of Environment and was published on July 8, 2020, in *Water Research*, a renowned international journal for environmental science and water resources.

