

2nd International Conference and Expo on

Water Microbiology & Novel Technologies

August 28-30, 2017 Philadelphia, USA

The drinking water treatment process as a potential source of affecting the bacterial antibiotic resistance

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Two waterworks, with source water derived from the Huangpu or Yangtze River in Shanghai, were investigated, and the effluents were plate-screened for antibiotic-resistant bacteria (ARB) using five antibiotics: ampicillin (AMP), kanamycin (KAN), rifampicin (RFP), chloramphenicol (CM) and streptomycin (STR). The influence of water treatment procedures on the bacterial antibiotic resistance rate and the changes that bacteria underwent when exposed to the five antibiotics at concentration levels ranging from 1 to 100 µg/mL were studied. Multi-drug resistance was also analyzed using drug sensitivity tests. The results indicated that bacteria derived from water treatment plant effluent that used the Huangpu River rather than the Yangtze River as source water exhibited higher antibiotic resistance rates against AMP, STR, RFP and CM but lower antibiotic resistance rates against KAN. When the antibiotic concentration levels ranged from 1 to 10 µg/mL, the antibiotic resistance rates of the bacteria in the water increased as water treatment progressed. Biological activated carbon (BAC) filtration played a key role in increasing the antibiotic resistance rate of bacteria. Chloramine disinfection can enhance antibiotic resistance. Among the isolated ARB, 75% were resistant to multiple antibiotics. Ozone oxidation, BAC filtration and chloramine disinfection can greatly affect the relative abundance of bacteria in the community. Ozone oxidation can give a great effect on ARGs removal. Relative abundances of ARGs, transposases, and integrons increased significantly after biological activated carbon filtration. The final chloramine disinfection can't guarantee the deactivation of ARGs.

Biography

Xiaohui Bai has completed his PhD from Harbin Institute of Technology and Post-doctoral studies from Zhejiang University School of Environment and Resources. He is the Director and Associate Professor of lab of water biology and process technology, School of Life Sciences and Biotechnology, Shanghai Jiao Tong University, China. He has published more than 10 papers in *Wat. Res.*, *Sci. Total Environ.*, *J Water Health*, *Wat. Sci. Tech.* and 4 books related to Ecological Engineering, Water Quality in Distribution System, Digital Water Quality and Drinking Water Quality Guideline.

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