

### 37. THE WATER – SOURCE OR VEHICLE FOR SPREADING ANTIMICROBIAL RESISTANCE?



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**Introduction.** Antimicrobial resistance is considered a threat to public health by the World Health Organization, and by 2050 it could become a hazard causing up to 10 million deaths yearly. It is all the more dangerous as it involves all elements of the environment, both as a reservoir and as a mode of transmission of resistant bacteria or their components (MGEs and ARGs) known as resistome. Water is considered to be the main vehicle for spreading the antimicrobial resistance, as 92% of ARGs found in water is also found in other environmental elements.

**Aim of study.** To elucidate the role of water in the development of antimicrobial resistance and its dangerousness as a reservoir of various resistomes.

**Methods and materials.** 372 articles were retrieved from PubMed (n=225) and Scopus (n=147) databases using the keywords “antimicrobial resistance”, “resistome”, “water” and “ARGs”. In the final research, 16 full-text articles were included.

**Results.** Seven studies claim that wastewaters either hospital or urban are the main source of antimicrobial resistance in the environment and other water bodies. Groundwaters are often contaminated with ARGs from wastewaters and consumed without treatment. Liu et al. determined over 1000 ARGs belonging to 37 ARG types in the global groundwater, dominated by rifampicin and quinolone resistance genes. Another paper from Liu et al. argues that freshwater lakes are the main reservoir of ARGs and resistomes due to their long retention in the water, hence the extended possibilities of antimicrobial resistance evolution in bacteria. The paper of Spänig S. analyzed the ARGs detected in 274 European lakes and showed that lakes from Romania, Germany and France are important reservoirs of cephalosporin resistance genes. On the other hand, Lee et al. consider the rivers to be the main channels for human exposure to antimicrobial resistant bacteria or their elements. They identified a resistome comprising 65 ARG subtypes, but

**Conclusion.** Aquatic environment has an important role in spreading and maintaining the AMR cycle as all waterbodies collect the ARGs and resistant bacteria from other environments and its roles as source and spreading vehicle can't be dissociated. Also, each type of water body carries its own resistome that endangers human health and environmental safety.