Characterisation of antibioresistance of bacterial communities in a mediterranean karst system: impact of hydrogeological functioning during the hydrological cycle

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Abstract : Karst aquifers are a major water resource supplying more than 25 % of the world population and up to 50 % of the population in the Mediterranean basin. However, karst groundwater is particularly vulnerable to anthropogenic contaminations due to fast transit from the surface through direct flow pathways. Karst features thus play a crucial role in interconnecting surface and subsurface ecosystem, which contribute to the circulation of antibiotic-resistant bacteria. Microbial community in karst groundwater as well as the impact of groundwater for emergence and dissemination of antibioresistance is still few documented despite the relevance for human health.**This project focus on the role of karst as reservoir for antimicrobial resistance in Mediterranean area submitted to a high water demand. The Lez aquifer is a typical Mediterranean karst aquifer, which supplies drinking water to the city of Montpellier. The aim of this study is (1) to evaluate the diversity and the antibiotics resistance of bacterial communities in contrasted hydrological conditions, and (2) to establish relations with the hydrogeological structure and the hydro-chemical characteristics of waters.**Since April 2014, the Lez spring was sampled during high, low and normal flows, for hydrochemical (major and trace elements, Total Organic Carbon, dissolved gases) and microbiological analyses. We develop an original mixed method associating i) study of the culturable bacterial community according to diverse antibiotics concentrations, and ii) taxonomic affiliation of resisting bacteria by 16S rRNA gene PCR-Temporal Temperature Gradient Gel Electrophoresis (TTGE) and sequencing. Minimal antibiotic concentrations inhibiting 50%, 70% and 90% of the whole culturable community were determined. **We observed that resistance level to antibiotics (Amoxicillin, Ceftazidime and Cefotaxime) varies according to the sampling period, thus according to the residence time of water in the karst aquifer and to the mixing between different types of fluxes. Thereby, these considerations are important to elucidate how hydrogeology and human practices can impact on diversity and dynamics of microbial communities in karst groundwater.

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