Rivers as reservoirs and disseminators of antibiotic resistance

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Bacterial antibiotic resistance has recently been considered by the World Health Organization as one of the three main threats of this century to human health. This threat is clearly not confined to health-care settings. Rivers, as main receptacles for contaminants, are probably reactors for the spread and evolution of antibiotic resistance.

We recently developed research to uncover the role of rivers as disseminators of antibiotic resistance. We focused on resistance to antibiotics that are critically important for human health.

Higher prevalence of antibiotic resistant bacteria was found in polluted rivers, along with an extensive diversity of antibiotic resistance genes; several of those genes are frequently associated to clinical isolates. Some of the bacterial strains recovered from polluted waters belong to species recognized as important human pathogens. These findings suggest that anthropogenic impacts on water environments promote the dissemination of antibiotic resistance. The presence of bacteria harboring genetic determinants of resistance in water sources that are used for irrigation, recreational activities or fishery, constitutes a relevant risk to human health. In fact, antibiotic resistance may be transferred to human-associated bacteria through water contact or consumption of contaminated food.

This project is still ongoing and our long term aim is to provide to the authorities tools for effective decision making on antibiotic usage and sustainable management of water resources.

REFERENCES

Detailed information can be found on the following reference: Tacão M, A Correia, I Henriques. 2012. Has antibiotic resistance cracked the (lotic) system? - polluted vs unpolluted environmental resistome. Applied and Environmental Microbiology 78:4134–4140. DOI: 10.1128/AEM.00359-12.

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FIGURE 1
The Vouga River basin with the location of the sampling sites under study.

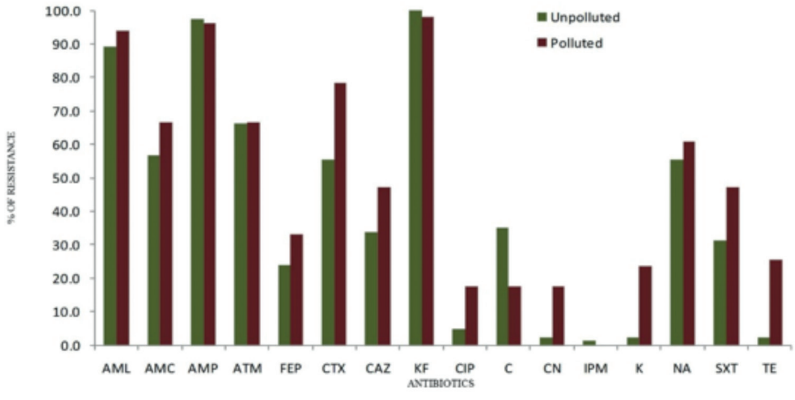

FIGURE 2
Resistance to several antibiotics in unpolluted and polluted sites.