

Antibiotic resistance of *Vibrio* spp. isolated from German North and Baltic Sea coastal waters and sediments

Brennholt Nicole¹, Wesp Jessica¹, Herrig Ilona¹, Reifferscheid Georg¹, Szewzyk Regine² and Fleischmann Susanne¹

¹ Department Biochemistry and Ecotoxicology, Federal Institute of Hydrology, Am Mainzer Tor 1, 56068 Koblenz, Germany

E-mail: brennholt@bafg.de

² Department Microbiological Risks, German Environment Agency, Corrensplatz 1, 14195 Berlin, Germany

Vibrio spp. are ubiquitous bacteria in estuarine and sea water environments. Within this genus 12 species appeared to be **human pathogenic**, in particular *V. parahaemolyticus*, *V. vulnificus* and *V. cholerae*. They can cause gastroenteritis or wound infections (sometimes followed by septicemia). In the case of gastroenteritis, when antibiotic treatment is clinically indicated, means of choice are Doxycycline (class of antibiotics: Tetracycline) or Ciprofloxacin (class of antibiotics: Quinolone). *V. vulnificus*-infections, although rather rarely seen, but when often with severe outcomes, are treated with Cephalosporine (class of antibiotics: β -Lactamases) or Doxycycline (Alter et al. 2011).

Today a variety of different classes of antibiotics based on their mechanisms of action are known (van Hoek et al. 2011). But the extensive application of antibiotics in human and veterinary medicine as well as in agriculture have impacted bacterial communities and resulted in various resistances to the antibiotics (which are genetically controlled by **antibiotic resistance genes** (ARG)). Thus the emerging of ARGs, inter alia in aquatic environments, is becoming an increasing worldwide concern (Zhang et al. 2009).

In Germany severe ***Vibrio*-related human infections** after contact with sea water are known since 1994. Ever since, outbreaks of *Vibrio*-infections have been reported for the Baltic Sea coast following summer heat waves. For the more saline waters of the North Sea, only single cases of *Vibrio*-infections have been reported in the recent past. Concern is growing that *Vibrio* infections may become an emerging disease in Northern European coastal waters particularly with regard to **climate change** (Baker-Austin et al. 2013). Consequently, it is of utmost interest to find out whether environmental isolates of *Vibrio* spp. exhibit antibiotic resistances in order to provide optimal targeted treatment of *Vibrio*-infections.

The occurrence of antibiotic resistance in human pathogenic *Vibrio* spp. (in particular *V. parahaemolyticus*, *V. vulnificus*, *V. cholerae*) with regard to clinical isolates is already known (e.g. through the formation of **β -Lactamases**) (Obaidat et al. 2017). Our current study examines if *Vibrio* spp. strains of environmental samples from the German North and Baltic Sea coastline also exhibit antibiotic resistances against commonly used antibiotics like **Penicilline, Cephalosporine and Carbapeneme**. In order to investigate the spatial and seasonal pattern of ARGs of *V. parahaemolyticus*, *V. vulnificus* and *V. cholerae* a monitoring study was carried out at bathing sites along the German North and Baltic Sea coast. Thereby water and sediment samples were taken monthly at 7 sites in total over a 1-year period. Samples were analysed with culture-dependent and molecular methods for potentially pathogenic *Vibrio* spp. ARGs were determined by **multiplex real-time PCR** for all isolates.

Using the data provided in this study, conclusions may be drawn concerning the occurrence and the distribution of already existing antibiotic resistances in the aquatic environment and the **bathing sites** of North and Baltic Sea, respectively.

Alter et al. 2011. Bundesgesundheitsblatt 54:1235-1240

Baker-Austin et al. 2013. Nature Climate Change 3:73-77

Van Hoek et al. 2011. Frontiers in Microbiology 2:203

Obaidat et al. 2017. Journal of Food Protection 80:2060-2067

Zhang et al. 2009. Applied Microbiology and Biotechnology 82:397-414

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