

P0655

Paper Poster Session

MDR Gram-negatives in food and the environment

The susceptibility of antibiotic resistant bacteria to heavy metals among strains isolated from the wastewater treatment plant

Marta Piotrowska*¹, Magdalena Popowska¹

¹*Department of Applied Microbiology, Institute of Microbiology, Faculty of Biology, University of Warsaw, Warsaw, Poland*

Background: The spread of antibiotic resistance among clinical and environmental bacterial pathogens represents a considerable public health concern. Increasing number of publications suggest that besides uncontrolled usage of antibiotics, metal contamination could also play an important role in the persistence and proliferation of antibiotic resistance. These co-selection mechanisms involve co-resistance, which occurs when resistance genes (both antibiotics and heavy metals) are located on the same mobile genetic element, e.g. plasmid, transposon or integron cassette, which helps to keep the entire genetic load in the presence of only one selection agent. Relationship between antibiotic and heavy metals resistance among different species of bacteria has been widely studied and its profile is based both on the phenotypic and molecular experiments. The aim of this project was to examine the level of resistance to selected heavy metals among beta-lactam resistant *Aeromonas* strains, isolated from the wastewater treatment plant (WWTP). The study was funded by the NSC (Poland), grant PRELUDIUM nr 2014/15/N/NZ9/00439 and by the MSHE, grant DSM nr 501/86-110133

Material/methods: The forty *Aeromonas* sp. strains with confirmed beta-lactamases genes presence were chosen for this study. Antimicrobial susceptibility testing was performed by the agar dilution breakpoint method as described by CLSI and included 12 different beta-lactam antibiotics. The Minimal Inhibitory Concentration (MIC) for 7 selected heavy metals and metalloids was also performed using microdilution method. The obtained MIC values were compared with the results obtained for the reference strain *Escherichia coli* K-12 and the strains were classified as resistant if their MIC values were higher than those in the control strain. Each experiment was performed in duplicate. Finally, identification of mercury resistance genes (*mer*) was performed by PCR and confirmed by sequencing.

Results: The MICs of the strains ranged from 25 µg/ml to 3200 µg/ml and varied depending on tested heavy metal. Selected strains showed high resistance to copper, zinc, chromium and arsen. None of the tested strains were resistant to cobalt. In some of the strains *mer* genes also have been identified. Generally, most of the beta-lactam resistant strains demonstrate a high level of resistance to heavy metals, which can be explained by cross-resistance mechanism, e.g. by efflux pumps.

Conclusions: To conclude, these results indicate the possibility of the occurrence of co-selection mechanism among tested *Aeromonas* strains. The presence of only one resistance factor (heavy metal or antibiotic) could increase the rate of horizontal transfer of antibiotic resistance genes and create the conditions for maintaining these genes in the environment.