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Human pathogens and antibiotic-resistant enterobacteria in fresh produce

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Abstract:

Since 2011, when a Shiga toxin- and extended-spectrum beta-lactamase-producing *Escherichia coli* led to an epidemic with many deaths in northern Germany, there has been an improved awareness for potential transmission of human pathogens via fresh produce. Until that time, fresh produce on the German market had appeared to be relatively safe for consumption. In our study we evaluated the microbiological status of fresh produce on the northern German market in the years 2015 and 2016 and found a very low incidence of *Salmonella*, Shiga toxin-producing *Escherichia coli* and *Listeria monocytogenes* (Fiedler et al. 2017). However, sporadic contamination of fresh produce appears to be unavoidable as we could identify one imported mushroom product which was contaminated with ca. 1×10^5 CFU/ml of *Listeria monocytogenes*. Thus, we should be constantly vigilant and monitor this important food regularly. Our study furthermore showed the presence of antibiotic-resistant, opportunistic pathogenic Enterobacteria in fresh produce (Strains of *Citrobacter*, *Enterobacter*, *Klebsiella*, *Serratia*, *Kluyvera*, *Morganella* and *Pantoea* species). These bacteria naturally occur on plants and are present in environmental samples like soil and water. We sequenced the genomes of the resistant isolates and found mainly acquired antibiotic-resistances for tetracyclines, quinolones, aminoglycosides, sulphonamides and beta-lactam antibiotics. Often these strains harbored plasmids, some of the incompatibility group F (IncF) types, which are known to readily transfer among enterobacteria. Further investigations are necessary to determine whether the resistance genes are indeed located on plasmids and whether these can be transferred between bacterial communities.