



Progetto strategico d'Ateneo 2017 "Carbapenemase-producing bacteria: from the environment to humans or vice versa?"

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Carbapenems are β -lactam antimicrobial agents with a broad spectrum activity and they are considered as last-line therapeutics to treat infections caused by multidrug-resistant Gram-negative bacteria. During the last few years, the prevalence of resistance to carbapenems has increased worldwide, especially in *Enterobacteriaceae*, as well as in non-fermenters such as *Pseudomonas* spp. and *Acinetobacter* spp. Of particular concern is the increased carbapenem-resistance among clinical isolates of *Klebsiella pneumoniae*, with a high rate of mortality (up to 40%), as well as of carbapenem resistant *E. coli* strains arisen within widespread epidemic lineages such as ST131 clone.

To date, infections due to Carbapenemase-Producing *Enterobacteriaceae* (CPE) are predominantly associated with healthcare institutions; nevertheless, reports regarding their occurrence in the community, animals and environment are increasingly frequent. The rapid dissemination of CPE is also promoted by the location on transmissible plasmids of carbapenemase encoding genes (CEG) that lead to the production of β -lactamases (carbapenemases) able of hydrolyzing carbapenems. Plasmid acquired class A (KPC-type), class B (VIM-, IMP- and NDM-type), or class D (OXA-48-type) carbapenemases are the most prevalent in *Enterobacteriaceae*. The origin of the CEG still remains to define but their detection also in bacterial species from natural habitats suggests that non-human sources may be reservoir of carbapenemase producers.

The real prevalence of CEG in zoonotic bacteria or commensals from animals is unknown and few reports of carbapenemases in bacteria from retail meat or other foodstuffs are available. Consequently, there is a need for intensified surveillance on the occurrence of CPE in the food chain and in different environmental compartments to identify conditions that can enhance their spread and to assess the actual risk for human health.

In order to fill this gap our project aims to gain insight into the dissemination of CPE in our geographical area assessing the prevalence and distribution of CEG and CPE in samples of different origin.