

# Imipenem and cephem resistant *Pseudomonas aeruginosa* carrying plasmids coding for class B beta-lactamase

## Abstract:

From October 1988 to January 1992, nine isolates of *Pseudomonas aeruginosa* carrying transferable plasmids encoding imipenem-hydrolyzing beta-lactamase (pI = c. 9.5) were recovered from nine different patients in a neurosurgical ward of a hospital in Japan. The beta-lactamase activities of the sonicated extracts from the transconjugants were inhibited by EDTA and this was partially reversible by the addition of zinc cation. The substrate specificity and pI of the beta-lactamase were similar to those of the metallo beta-lactamases from *P. aeruginosa* and *Serratia marcescens* TN9106. All strains were resistant to imipenem, carbenicillin and antipseudomonal cepheims including ceftazidime, cefsulodin, cefpirome, while four and five strains were susceptible to piperacillin and aztreonam, respectively. Both low level imipenem resistance and high level cephem resistance were co-transferred with the production of metallo beta-lactamase, while resistance to piperacillin, aztreonam, and high level imipenem-resistance were not selected. Production of chromosomal cephalosporinase in piperacillin resistant strains was derepressed, and production of outer membrane protein of D2 was diminished in highly imipenem resistant strains. Six strains were isolated in 1991, and the amounts of antipseudomonal agents, especially imipenem, used in the neurosurgical ward increased markedly in this year. Only three of the nine isolates had the same serotype, pyocin type and phage type. Our results suggest that the repeated isolation of imipenem and cephem-resistant *P. aeruginosa* producing metallo beta-lactamase was related to the high usage of antipseudomonal beta-lactam antibiotics such as imipenem, and was exacerbated by the dissemination of a plasmid.