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Emerging antimicrobial resistant pathogens in animals (MRSA/MRSIG/ESBL) in Korea

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The use of antimicrobials in food-producing and companion animals for therapeutic and growth promotion purposes may select for bacteria resistant to antimicrobials used in humans, and the resistance may spread to humans via the food or close contact and cause human infection. The OIE *ad hoc* Group on antimicrobial resistance concluded that the refined list of antimicrobials of veterinary importance, which categorize antimicrobials as **critically important, highly important and important antimicrobials**, should refer only to antimicrobial use in food-producing animals and that use in non-food-producing animals be excluded because food is considered the most important vehicle for spread of antimicrobial resistance between animals and humans. However, number of people live with companion animals has dramatically increased in modern society and **the antimicrobial resistance in companion animals may cause significant impact on human health because of the intimate contact between companion animals and human and frequent consumption of antimicrobial agents used in human medicine in companion animal veterinary practice, providing possibility of transfer of resistant bacteria or mobile resistance determinants between them.** Our study shows that veterinary staff and hospitalized dogs in companion animal hospital had the same **methicillin resistant *Staphylococcus epidermidis* (MRSE) strain - same staphylococcal cassette chromosome *mec* (SCC*mec*) and MLST, suggesting possible evidence of transmission of antimicrobial resistant bacteria or resistance determinants between them.** Since human infections caused by *S. intermedius* and *S. pseudintermedius* and the emergence of methicillin-resistant of theses isolates (MRSIG) have been recently reported, concerns on prevalence and antibiotic resistance in veterinary medicine is increasing. The 128 SIG isolates (71.9%) displayed multiple drug resistance (MDR) and 34 (65.4%) of the 52 methicillin-resistance gene (*mecA*)-carrying isolates were oxacillin-resistant. Except 3 *mecA*-positive oxacillin-resistant SIG isolates were MDR. The SCC*mec* typing showed one strain type IV and 41 strains type V. The result of PFGE indicated that same strains of SIG are present from companion animals,

veterinary staff and veterinary hospital environment. This suggests that there might be **a transmission or colonization of SIG or *mecA* gene between the three groups.** *E. coli* isolates producing CTX-M extended-spectrum β-lactamases (ESBLs) and/or AmpC enzymes from dogs and humans (n = 34) were comapred. The most commonly identified
was ST288 in human isolates, while ST857 and ST243 were the most common in canine isolates.. In canine isolates, the *bla*CTX-M and *bla*CMY-2 genes were located on incompatibility (Inc) group F plasmids, whereas the *bla*CTX-M-27 gene was located on an IncY plasmid. In human isolates, the *bla* genes of CTX-M (19/26, 73%) and CMY-2 (3/8, 37.5%) were frequently found on IncF plasmids, similar to canine isolates. However, the *bla* genes were also located on plasmids of other Inc groups. No canine isolates showed a clonal relationship to human isolates The results suggest that the dissemination, even across host species of humans and dogs, of *E. coli* isolates carrying the *bla* genes of CTX-M ESBLs and/or AmpC enzymes might mainly be achieved by a horizontal transfer of IncF plasmids, rather than a clonal expansion. In conclusion, companion animals should come up for infection control, as humans, to prevent further dissemination of antimicrobial resistance genes, because they might play an important role in transfer and reservation of those genes.

References

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