Transmissible fosfomycin resistance markers in urinary isolates and imported foodstuffs in the UK during 1994 and 1995


Katherine J. Graya, Deborah M. Gascoyne-Binzib,c, Philippa Nicholsonc, John Heritagec and Peter M. Hawkeyd

aDepartment of Medical Microbiology, 7th Floor Duncan Building, Daulby Street, Liverpool L69 3GA; bDepartment of Microbiology, The General Infirmary, Leeds LS1 3EX; cDivision of Microbiology, The University of Leeds, Leeds LS2 9JT; dDepartment of Immunity and Infection, The Medical School, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK

Sir,

There has been great interest in the transfer of antibiotic resistance markers between clinically important bacteria and bacteria present in foodstuffs. We carried out two small studies where fosfomycin resistance was detected in clinical isolates and isolates from foodstuffs during 1994 and 1995.

Fosfomycin is a broad-spectrum antibiotic that has been used extensively in European countries since 1973. It is a phosphoenuoyl pyruvate analogue that inhibits phosphoenuoyl pyruvate transerase, an enzyme that catalyses the early stages of peptidoglycan synthesis.1 Fosfomycin was introduced into the UK market in February 1994 but was withdrawn in 1996 for commercial reasons. Routine screening of clinically significant urinary isolates against fosfomycin during the period September to December 1994 was carried out at the Leeds General Infirmary. Surprisingly, during the period September to December 1994 was drawn in 1996 for commercial reasons. Routine screening of clinically significant urinary isolates against fosfomycin (15 samples)—were bought from delicatessens, market stalls and shops in Leeds during November and December 1995. A 10 g sample of each purchase was emulsified in 100 mL of nutrient broth (Oxoid, Basingstoke, UK) in a stomacher (Lab Blender 80; Merck, Dorset, UK). Pour plates were made using serial dilutions of the food in IsoSensitest agar (Oxoid) supplemented with 10 mg/L vancomycin, 187 mg/L fosfomycin trometamol and 25 mg/L glucose-6-phosphate.

Thirteen fosfomycin-resistant isolates (seven Enterobacter spp., two Serratia spp., three K. pneumoniae and one Rahnella aquatilis) were recovered from seven food samples (five vegetable and two cured meat samples). Amplification of the fosA gene was shown in two isolates (Enterobacter sakazakii and K. pneumoniae). Both of these samples originated in Spain and isolates were recovered from the skin of a courgette and a tomato, respectively.

Transfer of the fosfomycin resistance markers was attempted for all the fosfomycin-resistant food isolates and the two clinical urinary isolates that carried fosA. Escherichia coli strains UB1637 and UBS201 were used as recipients in conjugation experiments using a plate-mating method.5 Transconjugants were selected on IsoSensitest agar containing 25 mg/L nalidixic acid and 187.6 mg/L fosfomycin trometamol potentiated with 25 mg/L glucose-6-phosphate. We were unable to demonstrate transfer of fosfomycin resistance from the clinical urinary isolates. However, four of the 13 fosfomycin-resistant isolates from

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Correspondence

food showed conjugal transfer of resistance on plate mating. Only one of the two isolates that carried the \textit{fosA} gene was transferable (\textit{E. sakazakii}). Incubation of the \textit{fosA}-carrying clinical isolates with \textit{E. coli} (pUB307) on a Dorset egg slope, followed by conjugation with \textit{E. coli} UB1637, showed that the \textit{fosA} genes found in the clinical isolates were transposable.

In summary, we found that fosfomycin resistance markers were present in clinical and food-related isolates of Gram-negative organisms, despite a lack of antimicrobial pressure. Isolates from foods found to carry the \textit{fosA} gene were imported from Spain, a country that uses fosfomycin and has previously reported high rates of fosfomycin resistance from both clinical and sewage samples.\textsuperscript{6} We believe this is the first report of the detection of the \textit{fosA} gene in the UK. Although the \textit{fosA} gene was implicated as a mechanism of fosfomycin resistance in a minority of the isolates, \textit{fosA} was transmissible from one food isolate. Evidence indicated that the \textit{fosA} genes in the clinical isolates were transposable and that the \textit{fosA} genes were not transmitted between strains by conjugation. The presence of transmissible fosfomycin resistance in bacteria recovered from imported foodstuffs is consistent with our hypothesis that food could act as a vehicle for the spread of antimicrobial resistance. Further delineation of this problem would seem appropriate, as these findings suggest the potential compromise of local/national antibiotic prescribing policies to control the emergence of resistance. Moreover, this may be an additional issue that should be considered when assessing food safety.

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References