A B S T R A C T

One hundred and sixty-nine multiply resistant gram negative bacteria isolated at UHWI were tested for their ability to transfer their antibiotic resistance to a recipient Escherichia coli K12 strain J53-2. The isolates were representatives of 9 different genera. The majority of the isolates (68) were from urine, 48 isolates were Salmonella ohio strains from stools, and the remaining 53 isolates were from blood, pus, burn swabs and other sources.

82.8% of the 169 isolates tested transferred part of all of their resistance determinants to strain J53-2 at 37°C. The incidence of transferable resistance was found to differ according to the genera considered with quite high frequencies in some genera, e.g. S. ohio (100%), E. coli (80.9%) and Klebsiella pneumoniae (72.3%), and the lowest incidence in Acinetobacter (20%).

A higher frequency (80.9%) of transferable resistance was demonstrated in urine than non-urine (69.8%) isolates. In addition, particular genera (E. coli, K. pneumoniae, Proteus and Enterobacter) had a higher incidence of transferable resistance when organisms were isolated from urine than when isolated from non-urine specimens.

The incidence of resistance to trimethoprim (Sxt), tetracycline (Te), cephaloridine (Cf) and ampicillin (Am) was higher than that of resistance to gentamicin (Gm), amikacin (AN) and tobramycin (NN). Similarly, transfer of resistance to Sxt, Te, Cf and Am occurred with higher frequency than transfer of resistance to Gm, AN and NN.

Simultaneous resistance to 3, 4 and 5 antibiotics was more prevalent (accounting for 72.8% of the positive isolates) than was simultaneous resistance to 1, 2, 6 and 7 antibiotics (27.2% of the positive isolates). Transfer of resistance to 1, 2, 3 and 4 antibiotics occurred more frequently than transfer of resistance to 5, 6 and 7 antibiotics.

Experiments were done to validate the method used to detect transferable resistance. The biochemical characteristics, nutritional requirements and antibiotic resistance of E. coli K12 strain J53-2 exconjugants obtained from transfer experiments indicated that the method used was a valid one for detection of transferable resistance.

Filtrates of multiply resistant donor isolates did not transfer resistance to E. coli K12 strain J53-2. Transfer of resistance by whole cell cultures of the donors to J53-2, was unaffected by the presence of deoxyribonuclease I in the medium used for mating.

Of the 29 isolates that did not transfer resistance to E. coli K12 strain J53-2 at 37°C, 13 (44.8%) were able to do so at 30°C, 4 (13.8%) were unable to transfer resistance because they produced a colicin that was active against J53-2 and 5 (17.2%) possessed nonconjugative R plasmids which could not be transferred to J53-2 unless another "intermediate" host, E. coli K12 strain NH4104 was present. Three of the twenty-nine isolates were lost during storage.

Two of seven isolates, an E. coli and a Serratia marcescens isolate, tested for curing of antibiotic resistance by use of acridine orange and/or ethidium bromide demonstrated curing of part or all of their antibiotic resistance. Results of the curing experiments were inconclusive.

Taking into account transferable resistance at 37°C and 30°C, the presence of nonconjugative R plasmids and loss of donors in storage this study provided evidence for the occurrence of R plasmids in 91.8% of 169 gram negative bacteria isolated from UHWI during the period May 1983 to March 1984. For two of the isolates with transferable resistance demonstration of curing of antibiotic resistance provided further evidence for plasmid encoded resistance.