

DIFFERENCES IN ANTIBACTERIAL RESISTANCE RELATED TO DIFFERENCES IN CELL ENVELOPE STRUCTURE OF PSEUDOMONAS AERUGINOSA AND PSEUDOMONAS CEPACIA

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Pseudomonas cepacia has a different resistance pattern from Pseudomonas aeruginosa (Moody, Young & Kenton, 1972). In this study the effect of subinhibitory concentrations of polymyxin and disodium edetate (EDTA) on the morphology of the cell envelope of both species was compared using the electron-microscope technique of Richards & Cavill (1976). The resistance of certain cell suspensions to polymyxin was also evaluated. P. cepacia NCTC 10661 and P. aeruginosa NCTC 6750 were the test organisms.

Thin sections of P. cepacia grown in Oxoid nutrient broth No. 2 showed convoluted external layers similar to P. aeruginosa grown in the presence of 0.1% EDTA. P. cepacia cells grown in broth plus 0.1% EDTA did not show marked differences from normal. Likewise polymyxin 25 units ml⁻¹ had no discernable effect on the structure of P. cepacia but 2.25 units ml⁻¹ affected the outer layers of P. aeruginosa and 6.0 units ml⁻¹ severely damaged the cells.

Double washed P. aeruginosa cells, which had been grown on nutrient agar plus 0.1% EDTA for 60h and suspended in 0.9% sodium chloride, were compared for resistance to polymyxin B. sulphate 50 units ml⁻¹ with double washed P. aeruginosa and P. cepacia cells both grown on nutrient agar. The test procedure of Richards & McBride (1971) was followed.

P. aeruginosa 5 x 10⁶ ml⁻¹ grown on nutrient agar were killed in 20 - 40 min and P. aeruginosa 5 x 10⁶ ml⁻¹ grown on nutrient agar plus 0.1% EDTA in 120 - 150 min but P. cepacia 3 x 10⁹ ml⁻¹ were not killed within 360 min. Thus P. aeruginosa cells grown in the presence of EDTA 0.1% were more resistant to the action of polymyxin than cells grown on nutrient agar alone but were not as resistant as the P. cepacia cells.

The foregoing observations relate the differences in resistance of these two organisms to a difference in structure of the external layers of the cells. It is likely that this includes either a quantitative and/or qualitative difference in the lipopolysaccharide content of the two types of cell because both EDTA and polymyxin are known to react with the lipopolysaccharide of P. aeruginosa.

Moody, M.R., Young, V.M. & Kenton, D.M. (1972). Antimicrob. Ag. Chemother., 2, 344 - 349.

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