

**LIPOSOME-ENCAPSULATED CARBAPENEMS**

ZUZANNA DRULIS-KAWA<sup>1\*</sup>, JERZY GUBERNATOR<sup>2</sup>, KAMIL  
KOSTYN<sup>2</sup>, WŁODZIMIERZ DOROSZKIEWICZ<sup>1</sup> and ARKADIUSZ  
KOZUBEK<sup>2</sup>

<sup>1</sup>Institute of Microbiology, University of Wrocław, Przybyszewskiego 63/77,  
50-148 Wrocław, Poland, <sup>2</sup>Institute of Biochemistry and Molecular Biology,  
University of Wrocław, Przybyszewskiego 63/77, 50-148 Wrocław, Poland

Microorganisms have developed various ways to resist the toxic effects of antibiotics. One example is the low permeability of the outer membrane of gram-negative bacteria [1, 2]. For example, *Pseudomonas aeruginosa* (a gram-negative bacteria), a clinically significant opportunistic pathogen, is resistant to many antibiotics due to the low permeability of its outer membrane. Only a few antimicrobial agents (e.g. carbapenems) show antibacterial activity against this species. The carbapenem-resistant strains of *Pseudomonas aeruginosa* are associated with the presence of the outer membrane proteins OprM and OprN [3] or with absence of the porin protein D2 [4]. In this study, we constructed three types of liposome containing meropenem and examined their antimicrobial activities and biochemical properties. We suppose that the permeation of the liposome-encapsulated meropenem was not dependent on outer membrane proteins and was active against the carbapenem-resistant strains of *Pseudomonas aeruginosa*.

**REFERENCES**

1. Putman, M., van Veen, H.W. and Konings, W.N. Molecular properties of bacterial multidrug transporters. **Microbiol. Mol. Biol. Rev.** 64 (2000) 672-693.
2. Nikaido, H. Outer membrane barrier as a mechanism of antimicrobial resistance. **Antimicrob. Agents Chemother.** 33 (1989) 1831-1836.
3. Masuda, N., Sakagawa, E. and Ohya, S. Outer membrane protein responsible for multiple drug resistance in *Pseudomonas aeruginosa*. **Antimicrob. Agents Chemother.** 39 (1995) 645-649.
4. Fung – Tomc, J.C., Huczko, E., Banville, J., Menard, M., Kolek, B., Gradeliski, E., Kessler, R.E. and Bonner, D.P. Structure – activity relationships of carbapenems that determine their dependence on porin protein D2 for activity against *Pseudomonas aeruginosa*. **Antimicrob. Agents Chemother.** 39 (1995) 394-399.

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\* E-mail: kawa@microb.uni.wroc.pl