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OPORNOŚĆ *STREPTOCOCCUS PNEUMONIAE* NA PENICYLINĘ I INNE ANTYBIOTYKI β-LAKTAMOWE

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1. Wstęp. 2. Rozprzestrzenianie się oporności na penicyliną wśród *S. pneumoniae* na świecie. 3. Białka wiążące penicyliną- miejsca docelowe antybiotyków β-laktamowych u *S. pneumoniae.* 4. Mozaikowe *geny pbp.* 5. Klonalne rozprzestrzenianie się oporności na penicylinę 6. Tolerancja *S. pneumoniae* wobec penicyliny. 7. Wysoki poziom oporności na antybiotyki β-laktamowe związany ze zmianami w operonie *murMN.* 8. Oporność na antybiotyki β-laktamowe związana ze zmianami w genach *ciaH* oraz *cpoA* u mutantów laboratoryjnych. 9. Immunoprofilaktyka. 10. Podsumowanie

Resistance to penicillin and other β-lactams in *Streptococcus pneumoniae*

Abstract: *Streptococcus pneumoniae* (pneumococcus) is a common cause of pneumonia, bacteremia, meningitis, otitis media and sinusitis. Penicillin-resistant *S. pneumoniae* isolates were first detected in the 1960s and since then they have been isolated from patients in many parts of the world. The emergence and rapid spread of penicillin-resistant *S. pneumoniae* create a serious public health problem. Rates of penicillin-resistant *S. pneumoniae* are as high as 60% in some parts of Latin America and 80% in some countries in Asia. The 26 so-called international pneumococcal clones identified till now have significantly contributed to the rapid increase in resistance in pneumococci worldwide. Resistance to penicillin is due to the production of altered penicillin-binding proteins (PBPs) which have a decreased affinity for the antibiotic. Such PBP variants are encoded by genes of mosaic structure as a result of genetic exchange between pneumococci and related streptococcal species. PBP2x, PBP2b and PBP la are primary resistance determinants, and their modification is an essential step in the development of high-level resistance. An alteration in MurM, an enzyme involved in the biosynthesis of branched-stem cell wall muropeptides, is additionally required for the maximum expression of resistance to penicillin and other β-lactams. Mutations in *ciaH* or *cpoA* genes confer increased resistancc to β-lactam in cells that contain no alterations in PBP genes. The currently available vaccines are based on immunity to capsular polysaccharides of the pneumococcus of which more than 90 serotypes exist. The 23-valent polysaccharide vaccine, which is recommended for use in adults, contains capsular polysaccharides from the 23 capsular types of *S. pneumoniae.* For the immunization of children less than 2 years of age, a 7-valent conjugated polysaccharide vaccine is recommended.

1. Introduction. 2. The worldwide spread of penicillin resistance in *S. pneumoniae.* 3. Penicillin-binding proteins - the target of β-lactams in *S. pneumoniae.* 4. Mosaic genes *pbp.* 5. Clonal spread of penicillin resistance. 6. Penicillin tolerance in *S. pneumoniae.* 7. High-level β-lactam resistance mediated by alterations in *murMN* operon. 8. β-lactam resistance in laboratory mutants mediated by alterations in *ciaH* and *cpoA* gens. 9. Immunoprophylaxis. 10. Summary

Słowa kluczowe: antybiotyki β-laktamowe, , geny mozaikowe, PBP, *S. pneumoniae*
Key words: β-lactam antibioties, mosaic genes, PBP, *S. pneumoniae*