INVESTIGATION OF THE PHOTOSTABILITY OF MAGNESIUMCHLOROPHYLLIN IN BACTERIAL SUSPENSIONS

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Bacterial resistance to antibiotics is a growing concern in the treatment of human infections caused by them. It has become a serious problem in hospitals as there are many opportunistic pathogens that are dangerous to immunocompromised patients. *Stenotrophomonas maltophilia* is a multidrug-resistant Gram-negative opportunistic pathogen that can infect immunocompromised individuals, as well as patients with severe burns or other injuries. The bacterium can cause a variety of infections, including respiratory, circulatory, and urinary tract infections, which are often fatal. [1] Antimicrobial photodynamic therapy (aPDT) is a photochemical antimicrobial method which is used as an alternative to antibiotics. aPDT is based on the interaction of the photosensitizer, molecular oxygen, and light of the appropriate wavelength. During this therapy the photosensitizer is excited by light and interacts with molecular oxygen to produce reactive oxygen species that can cause various cell damage or even death [2]. Natural photosensitizer Magnesium chlorophyllin (MgChl) is known as a water-soluble anionic chlorophyll derivative with a main absorption maximum at 405nm, that exhibits antimicrobial activity that generates ROS after exposure to visible light.

The aim of this study was to analyse the photostability of (MgChl) in the bacterial cell suspensions depending on the type of solution.

The optical absorption of MgChl is known to decrease after activation with visible blue light in phosphate-buffered saline (PBS) without bacterial cells [3]. These changes show the dose dependence of activation and can be used to compare the irradiation efficiency using different spectral components. We compared the absorption characteristics of 0.015 mM MgChl after irradiation (1.1 J/cm^2 to 31.5 J/cm^2.) at the optimum excitation wavelength of 402 nm in *S.maltophilia* cell suspension (10^7 CFU/mL) in PBS (pH 7.4) and in a nutrient medium (tryptone soy broth, pH 7.2)

The results indicate that MgChl was more photostable in the PBS buffer than in the medium. This can be explained by the fact that the excitation of MgChl is inhibited by the lower penetration of light into the medium. The prospect of this research involves further investigating of antimicrobial effectiveness efficacy of MgChl by irradiating bacterial samples in a culture medium.

[1] Said, Mina S., ir et al. Stenotrophomonas Maltophilia., StatPearls Publishing, 2023. ncbi.nlm.nih.gov

[2] Cieplik, Fabian, ir et al., Antimicrobial Photodynamic Therapy, What We Know and What We Dont. Critical Reviews in Microbiology, t. 44, nr. 5, 2018.

[3] Buchovec, I. et al. J. Photochem. Photobiol. B, Biol., 2017, 172 10.