SONODYNAMIC PROPERTIES OF PHTHALOCYANINES

K. MIŁOWSKA, T. GABRYELAK

University of Łódź, Poland

Sonodynamic therapy is a new promising method to killing tumor cells based on the synergistic effect of ultrasound and certain compounds called "sonosensitizers". Ultrasound showed a high ability to focus on a small region of cancer, penetrating deeply within tissue, activating locally sonosensitizer and minimising damage to neighbouring healthy cells.

A selection of appropriate compounds, which show sonodynamic properties is also very important. These compounds, which are used in sonodynamic therapy should penetrate effectively into cancer cells and should not show cytotoxic properties in relation to healthy cells. Phthalocyanines (Pcs) are promising candidates for medical application in view of their photodynamic properties.

In this work nucleated erythrocytes were used as cell model to test two phthalocyanines (zinc and chloroaluminum) as potential sonosensitizers for sonodynamic therapy. Red blood cells after incubation with phthalocyanines were exposed to 1 MHz continuous wave at the intensity of 2.44 or 0.61 W/cm^2 for 5 min. These results showed that sonication with phthalocyanines led to an increase in the degree of hemolysis for both used intensities of ultrasound wave. It was noticed that US and phthalocyanines exposure led to an increase in the fluidity of the surface of plasma membrane in comparison to US alone and phthalocyanines alone. We also observed that sonication with and without phthalocyanines caused changes in morphology of erythrocytes. However, the combined action of Pcs and US did not increase the tail moment in comparison with the data obtained for the cells sonicated without Pcs. The results lead to the conclusion that phthalocyanines along with US had a synergistic effect on the cellular membrane and they can be used as a sonosensitizer for sonodynamic therapy.