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Photodynamic Therapy using Sulfonated Aluminum Phthalocyanine Mix for the eradication of Cervical Cancer, An in vitro Study

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The use of phthalocyanines in Photodynamic Therapy (PDT) has greatly altered the difficulties associated with the treatment of cancer. PDT is a treatment modality that uses photo-physical properties of a photosensitizer (PS), in the presence of light and molecular oxygen to eradicate cancer cells. The correct choice of PS used maximizes its therapeutic potential and efficacy. This study, therefore, investigates the effectiveness of Sulfonated Aluminum phthalocyanine Mix (AlPcSmix) in PDT for the treatment of cervical cancer, which in developing countries, South Africa included, is a common type of cancer among women, and the leading cause of cancer-related deaths. A working solution of AlPcSmix was prepared in Dimethyl Sulfoxide. Cervical cancer HeLa cells (ATCC® CCL2™) were cultured in liquid medium, Dulbecco's Minimum Eagle's Medium supplemented with 10% Foetal Bovine Serum and incubated at 37 °C, 5% CO₂ and 85% humidity. The cells were treated with varying concentrations of AlPcSmix. The treated cells were then irradiated using 673 nm diode laser at fluences of 5, 10 and 15 J/cm². Cellular responses were evaluated 24h post-irradiation using Trypan blue viability assay, Adenosine Triphosphate assay for proliferation, Lactate Dehydrogenase cytotoxicity assay for membrane integrity, and fluorescent microscopy for cellular localization. Results indicated that AlPcSmix localized in the mitochondria and lysosomes, and cellular responses showed dose-dependent structural changes, with increasing cytotoxicity and decreased cell viability and proliferation. Results obtained indicate AlPcSmix as an excellent choice of PS for use in PDT and the eradication of cervical cancer cells in vitro.

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