

عنوان مقاله:

Photodynamic Therapy and Lung Cancer Stem Cells – The effects of AlPcS4Cl on Isolated Lung Cancer Stem Cells

محل انتشار:

همایش بین المللی تحقیقات سرطان 2019 (سال: 1398)

تعداد صفحات اصل مقاله: 20

نویسندگان:

Anine Crous - *Laser Research Centre, Faculty of Health Sciences, University of Johannesburg, PO Box 17011, Johannesburg 2028, South Africa*

Heidi Abrahamse - *Laser Research Centre, Faculty of Health Sciences, University of Johannesburg, PO Box 17011, Johannesburg 2028, South Africa*

خلاصه مقاله:

Cancer is a worldwide burden. Claiming the lives of millions annually. Lung cancer is the leading contributor to mortality rates caused by cancer. Lowering risk factors such as tobacco consumption and industrial pollution can reduce lung cancer incidence. Yet it is noted to be counter-intuitive in emerging nations. An important disease entity is people who develop lung cancer regardless of avoiding factors leading to cancer. A subset of cells known to contribute to the high mortality rates seen in lung cancer is cancer stem cells (CSCs). Studies on CSCs have shown that they can evade conventional cancer treatment. Attributing to their stem-like characteristics is self-renewal, differentiation leading to phenotypical heterogeneity of tumor cells, metastasis and cancer recurrence. Expression of genetic markers involved in drug efflux, regeneration and motility contribute to the stem-like nature of CSCs. Photodynamic therapy (PDT) is an effective yet underutilized treatment modality for a variety of cancers. This form of alternative chemotherapy uses a non-toxic drug that has an affinity for cancerous cells. The drug localizes in intracellular organelles exerting an effect upon laser activation of the drug at a specific wavelength. Extensive research has been focused on the development of operative photosensitizers (PS), enhancing its selectivity and uptake into cancerous cells. Aluminium (III) Phthalocyanine Chloride Tetrasulphonate (AlPcS4Cl) is an improved second generation PS with ideal PDT characteristics including high photochemical reactivity, it is amphiphilic, has low dark toxicity, good localization and little light sensitivity. The effects and efficacy of PSs in the eradication of CSCs are not well studied. PDT can be a useful therapeutic tool in the eradication of CSCs, where factors such as fluence, dose, and localization play a crucial role. In this study, we evaluated the effects of (AlPcS4Cl) on isolated lung CSCs expressing stem-like markers involved in metastasis and drug resistance. Our findings suggest that treating CSCs using PDT is advantageous over standard cancer treatments. The results can be attributed to PDT not inducing drug resistance upon initial application of treatment to CSCs. This is due to passive absorption of the PDT drug which doesn't activate drug efflux pumps in the CSCs. This enables the PS to localize in the cell, ensuring biochemical responses upon laser activation leading to cellular toxicity and cellular death.

کلمات کلیدی:

Photodynamic Therapy, Photosensitizer, Lung Cancer Stem Cells, Surface Markers, Cell Death, Cytotoxicity, Proliferation, Viability

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