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Exploring the photodynamic potency of BMOV against breast cancer and breast cancer stem cells following laser irradiation at 405 nm

The serendipitous discovery and tremendous success of cisplatin paved way for the design and applications of transition metal-based anticancer agents. Likewise, another breakthrough in cancer treatment has been the introduction of photodynamic therapy, which uses a photosensitizer to generate reactive oxygen species and kill cancer cells. Recently, research has been focused on combining these two aspects, i.e., photodynamic therapy using organometallic complexes to harness maximum therapeutic effects. This *in vitro* study explores the effect of photodynamic therapy (PDT) using bis(maltolato)oxovanadium(IV) (BMOV) at 405 nm at different fluencies of 1, 1.5, and 2 J/cm2, in targeting breast cancer (MCF7). The cells were treated with IC50 concentration of BMOV (3.06 μM) followed by irradiation with 405 nm laser after 4h of treatment. The change in cellular morphology was observed using inverted microscopy. The cell death was analyzed through ATP proliferation and LDH cytotoxic assays. The morphology of MCF7 cells explained the degree of toxicity induced by photoirradiation at 405 nm in the presence of BMOV. Reduced ATP and increased LDH levels also implicated the cytotoxic effect of the extract towards MCF7. Furthermore, the optimized dose was also found to be effective against breast cancer stem cells (CD44+). However, the viability of normal mammary epithelial cells (hTERT-HME1) was not affected by BMOV and laser irradiation. The findings of the study suggest the possible application of laser irradiation at 405 nm with oxidovanadium (IV) complexes against breast cancer as well as cancer stem cells.

Apply to be considered for a student ; award (Yes / No)?

No

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