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Cell death induced by combination of phthalocyanine photosensitizer and doxorubicin on MCF-7 breast carcinoma cells.

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Cancer is one of the common diseases that affect and threatens our human existence. Breast cancer is an invasive heterogeneous disease and the second most common disease among woman worldwide. Virtually, curative degenerative diseases like cancer employ multiple therapeutic agents that targets different pathological processes. For this reason, combination therapy remains an alternative strategy to combat diseases like cancer. In this study, we evaluated the anticancer effect of phthalocyanine mediated photodynamic therapy in combination with low dose doxorubicin (0.5 μM) on MCF-7 cancer cells. In addition, we explore the cell death pathway elicited from the combination treatment. MCF-7 cells were incubated with low dose doxorubicin for 20 h, afterwards, various concentrations of phthalocyanine were added and further incubated for 4 h. Thereafter, the cells were irradiated with 681.5 nm diode laser at 4.55 wM/cm2 for 18 min 27 sec (5 J/cm2), and the cellular responses were measured. Cellular morphology was observed using inverted microscopy while the proliferation of cells was measured with homogenous ATP quantitative assay. The mechanism of cell death was investigated using Annexin V/PI flow cytometric analysis. Findings from this study shows that combination of phthalocyanine mediated photodynamic therapy and doxorubicin significantly enhances the anticancer efficacy of phthalocyanine-doxorubicin combination on MCF-7 cells than when used individually. It was observed that this combination treatment led to an apoptotic cell death pathway. Hence, this study suggests a new treatment opportunity for breast cancer to enhance its effectiveness and which warrants further investigation for its potential to reverse multidrug resistance.

Summary

Successful stories in cancer therapy have been based on combination therapy. Low dose of doxorubicin was effectively utilized with PDT to inhibit MCF-7 cancer cell proliferation and ultimately induce apoptotic cell death. Thus this combination regime is highly recommended.

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MSc

Main supervisor (name and email)
and his / her institution

Prof. Heidi Abrahamse
Director: Laser Research Centre
NRF SARChI Chair: Laser Applications in Health

Faculty of Health Sciences
University of Johannesburg
Email: habrahamse@uj.ac.za

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Primary author: Mr ANIOGO, Eric Chekwube (Laser Research Centre, University of Johannesburg)

Co-author: Dr GEORGE, Blassan (Laser Research Centre, University of Johannesburg)

Presenter: Mr ANIOGO, Eric Chekwube (Laser Research Centre, University of Johannesburg)

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