자유연제 1-3

Anticancer Effect and Cell Cycle Regulation of Photodynamic Therapy (PDT) Using 9-Hydroxypheophorbide-a and 660nm Diode Laser

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Objectives : This study was conducted to evaluate the anticancer effect and cell cycle regulation of PDT using 9-hydroxypheophorbide-a (9-HpbD-a) and 660nm diode laser.

Materials and Methods : To determine the cytotoxic effect of PDT using 9-HpbD-a and 660nm diode laser, human hypopharyngeal squamous cell carcinoma cell line (SNU-1041) was seeded into 96 well microplate at a density of 10,000cells/well for 24 hours. Cells were washed with media containing various concentration of 9-HpbD-a ranging from 0 to 0.75 mg/ml. Then laser treatment was performed using diode laser at various energy density (0, 1.1, 3.2, 6.4, 12.8 J/cm^2) and at various incubation time (0, 3, 6, 9, 12 hours) with 9-HpbD-a. The treated cells were incubated for 48 hours and MTT assay was carried out to measure the viability of cells. To evaluate the mechanism of cell cycle regulation of PDT, western blotting and FACS were performed to analyze changes of expression of cell cycle regulation genes (cyclin B1, cdc2, p27 and cyclin E).

Results : The cytotoxic effects were increased as the concentration of 9-HpbD-a and the irradiation energy dose were increased. The cytotoxicity did not change significantly as the time between addition of 9-HpbD-a and laser irradiation was increased from 6 to 12 hours. FACS analysis revealed cell cycle arrest in G2/M phase. The expression of cyclin B1, which regulate G2/M transformation, was markedly reduced while other regulatory genes did not change.

Conclusion : The results suggest that 9-HpbD-a has a potential for a new photosensitizer. The effect of PDT on cell cycle regulation appears to be one of its therapeutic mechanisms.