

## **MULTIPLE CELL DEATH PATHWAYS INVOLVED IN SYNERGISTICALLY INDUCED APOPTOSIS BY COMBINATION TREATMENT WITH CARBOPLATIN AND PHOTODYNAMIC THERAPY IN HUMAN ANAPLASTIC THYROID CANCER CELLS.**

Moon, Jeong Hwan<sup>1</sup>; Biswas, Raktim<sup>2</sup>; Yun, Min<sup>3</sup>; Ahn, Jin-Chul<sup>2</sup>; Chung, Phil-Sang<sup>1</sup>

<sup>1</sup>Department of Otolaryngology-Head and Neck Surgery, Beckman Laser Institute Korea, College of Medicine, Dankook University, Cheonan, Chungnam, Korea, Republic of; <sup>2</sup>Beckman Laser Institute Korea, Dankook University, Cheonan, Chungnam, Korea, Republic of; <sup>3</sup>Department of Otolaryngology-Head and Neck Surgery, College of Medicine, Dankook University, Cheonan, Chungnam, Korea, Republic of

**Background/Purpose:** Several conventional methods have been applied for the treatment of Anaplastic thyroid cancer (ATC) but all of them failed in complete recovery of the patients. In recent years, combination of several therapeutic methods may have some implications against ATC.

**Methods:** In this present study, combination of photodynamic therapy (PDT) and chemotherapy has been studied against human anaplastic thyroid cancer cells FRO. Cells were treated with a chemotherapy drug, carboplatin and PDT singly and in combination. Several parameters like cytotoxicity assay, apoptosis study, cell cycle analysis, confocal microscopic study and western blots were studied to check the efficacy of the combination treatment.

**Results:** Results showed that both PDT and CBDCA can induce apoptosis in FRO cells. But an enhanced efficacy was observed when the cells were treated with CBDCA and PDT in combination. An increased number of apoptotic cells, changes in mitochondrial membrane potential and also an increase in reactive oxygen species can be observed when the cells treated with PDT in combination with carboplatin. Several proteins related to different apoptotic pathways were also modulated in combination treatment.

**Discussion & Conclusion:** Combination treatment with carboplatin and PDT can simultaneously activate multiple apoptotic pathways. Therefore this simultaneous activation of multiple cell death pathways can induce a synergistic effect against FRO cells. With this combination treatment, not only an enhanced efficacy of PDT can be obtained, but the adverse side effects of the chemotherapy drugs can also be reduced by reducing the individual dose of the drugs.