

ABLATION OF AGGRESSIVE THYROID CANCER CELLS WITH HIGH INTENSITY FOCUSED ULTRASOUND AND ETHANOL

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Background/Purpose: Aggressive phenotypes of papillary thyroid cancer, which are associated with BRAF^{V600E} mutation, can progress to anaplastic tumor cancer Characterized by > 80% mortality within months. In this study, we have tested the Effect of High intensity focused ultrasound (HIFU) with or without ethanol exposure on the viability and proliferation rate of human ATC cell line SW1736 harboring BRAF^{V600E}.

Methods: SW1763 cells grown in T-75 flasks were trypsinized and pelleted after reaching the concentration of 10⁷ cells/ml. Cell pellets were incubated with ethanol in growth medium (1:1 proportion) or just in growth medium for one hour and then exposed to five different power level of HIFU. After treatment, the viability of cells was monitored each day by flow cytometry.

Results: There was a significant increase in both apoptotic and necrotic cells as we increased HIFU power. The combined treatment at HIFU power level 5 significantly reduces the number of viable and early apoptotic cells. Furthermore, it increases the number of late apoptotic cells compared to treatment with either HIFU or ethanol alone. Cell proliferation in the Ethanol + HIFU group is much lower than that in the control group.

Discussion & Conclusion: This therapy has high potential to become a leading treatment option for thyroid cancer patients who have recurrent disease or disease that is not recommended for thyroidectomy. This data indicate that HIFU in combination with ethanol injection may be effective for locally aggressive thyroid cancer ablation.