A Novel Approach to Understanding Cancer: The Effects of Antitumor Agents in P53 Gene Expression on the Early Development of Zebrafish Embryos

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Cancer is one of a vast collection of diseases that kills millions of people each year across the world. Normally helping to prevent cancer, tumor suppressor genes like Antigen NY-CO-13 (p53) have a possibility of becoming mutated by acquired mutations or germline mutations, allowing excessive cell proliferation to occur. High cell proliferation results in cells clustering, causing tumor formation. The purpose of this study was to determine if treatment with antitumor agents in the early development of Zebrafish embryos affected the gene expression of the p53 tumor suppressor gene. 4,740 Zebrafish embryos 48-hours-post-fertilization were divided into 20 embryos per 258 plates. 36 trials were conducted with either 40 µL or 20 µL of antitumor agents in each plate and the plates were incubated for 3 hours to 3 days. RNA was extracted from each group and was reverse-transcribed into cDNA, allowing qPCR to be performed. Results showed that antitumor agents that are used in radiation therapy to decrease apoptosis increased p53 gene expression by 2.63 to 7.0 fold, revealing a suggested increase of apoptotic behavior in p53. Gene expression was decreased with lower concentrations of antitumor agents by 0.1 to 0.8 fold and increased in higher concentrations by 2.6 to 2.0 fold. These results help to provide further information about tumor suppressor gene p53's induction of apoptosis and provide insights surrounding p53 in cancer research.

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