Tumorigenic Effect of a Cannabinoid Receptor Blocker in a Squamous Cell Carcinoma Cell Line: Implications for Treatment

Baksh, Daniel (School: Lancaster Catholic High School)

Squamous cell carcinoma (SCC) of the head and neck is the 6th most common cancer worldwide. There are 60,000 new cases and 10,000 deaths a year within the U.S. It is caused mainly by smoking and alcohol, with 5-20% caused by human papillomavirus (HPV). CB-1 receptors are part of the naturally occurring endocannabinoid system and can be found in the brain and oral mucosa. Last year's research found CB-1 receptors in 86% of head and neck squamous cell carcinomas. Marijuana is the second most commonly smoked substance in the US, after cigarettes. Its use is increasing as it has been made legal in many states as a medicinal agent to treat cancer patients, and for recreation. Marijuana has been found to injure the respiratory tract, similar to cigarette smoke. Some studies report marijuana to be a cause of head and neck squamous cell carcinoma, with an increased use of marijuana associated with an increased incidence of cancer, while other studies suggest a protective effect.

In this study a squamous cell carcinoma cell line was cultured, and then treated with Rimonabant hydrochloride, a selective CB-1 receptor antagonist or blocker. 500 nM and 1μM concentrations of blocker were used for 24 and 48 hrs. Ki-67 proliferative activity and cell counts were quantitated and compared to non-treated controls. There was a statistically significant increase in proliferative activity for both concentrations of the drug ($p<0.05$). Cell count was also increased for both doses but only statistically significant for 500 nM at 24 hrs and 1μM at 48 hrs. These findings provide strong evidence that cannabinoids may have a beneficial effect on squamous cell cancers by decreasing cell proliferation and growth, with possible implications for treatment.