

Utilizing *Caulobacter crescentus* To Target the Bcl-2 Gene and NF- κ B to Cause Apoptosis in Nasal Squamous Cell Carcinoma

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The most common type of paranasal sinus and nasal cavity cancer is squamous cell carcinoma. If left untreated, this cancer has a survival rate of 43%. The status quo treatment options for this cancer include surgery, radiation therapy, or chemotherapy, which are expensive, damaging, and invasive. This study investigates the anti-cancer properties of *Caulobacter crescentus*, and its possible role on the activation of the NF- κ B-Bcl-2 apoptotic pathway in squamous cells. In this study, cancer and non-cancerous cells were exposed to *Caulobacter crescentus* at varying concentrations. Using cytotoxicity and ELISA assays, data was collected on cell viability, cell cytotoxicity, and the levels of Bcl-2 and NF- κ B in vitro. The researcher hypothesized that the cancer cells with the most-concentrated treatment (2×10^5 bacteria cells) would have increased levels of NF- κ B and decreased levels of Bcl-2, while the non-cancerous cells would remain unaffected. Cancer cells exposed to the most-concentrated bacteria treatment had increased levels of NF- κ B and decreased levels of Bcl-2 compared to untreated cancer cells. Treated non-cancerous cells showed decreased NF- κ B levels and stable levels of Bcl-2. Furthermore, while treated non-cancerous cells maintained their viability, treated cancer cells showed a decline in their overall viability when compared to non-treated cancer cells. These results show that apoptosis may be involved in the investigated cell death process. These results help provide insight on how *Caulobacter crescentus* causes apoptosis in cancer cells, and how they can be used to create a safe, non-invasive, and targeted alternative to current cancer treatment therapies.

Awards Won:

Second Award of \$2,000