

Fennel constrains growth of pancreatic cancer by inhibition of proliferation and promotion of apoptosis

Rex Perry DO ' 26¹, Trent Mayberry², Braydon Cowan², Nathan Haines², Qian Bai², Mark R. Wakefiel^{2,3}, Yujiang Fang^{1,2,3}

¹*Department of Microbiology & Immunology, Des Moines University College of Osteopathic Medicine, West Des Moines, IA, 50266*

²*Department of Surgery, University of Missouri School of Medicine, Columbia, MO, 65212*

³*Ellis Fischel Cancer Center, University of Missouri School of Medicine, Columbia, MO, 65212*

Background: Pancreatic cancer is one of the deadliest cancers. Despite current gold-standard treatment regimens, outcomes are overwhelmingly poor. Novel therapies are necessary to improve treatment of pancreatic cancer. Previous studies show that phytochemicals in fennel decrease the incidence of colon cancer and the multiplicity of breast cancer. However, no studies have explored the effect of fennel on pancreatic cancer.

This study investigates the effect of fennel on growth of pancreatic cancer and its possible molecular mechanisms.

Methods: Clonogenic survival assay, cell proliferation, TUNEL staining, and caspase-3 activity kits were used to evaluate the direct effects of fennel seed extract (FE) on cell survival, proliferation, and apoptosis of the widely-studied pancreatic cancer cell line Pan-48. We further investigated possible mechanisms using RT-PCR and IHC.

Results: The percentage of colonies of Pan-48 pancreatic cancer cells decreased significantly after FE treatment. This paralleled a decrease in the OD value of cancer cells treated with FE. Furthermore, the relative caspase-3 activity increased significantly in the presence of FE. The anti-proliferative effect of FE on Pan-48 pancreatic cancer cells correlated with increased expression of p16 and p53. Likewise, the pro-apoptotic effect of FE correlated with increased expression of Fas, TRAIL, TRAILR1 and decreased expression of Bcl-2. Studies about TUNEL and IHC are in progress.

Conclusions: Fennel constrains growth of pancreatic cancer by inhibition of proliferation and promotion of apoptosis. Further investigation may provide insight into the mechanisms of these changes, along with the potential for fennel as a powerful natural agent in treating pancreatic cancer.