

EVALUATION OF NASOPHARYNGEAL CARCINOMA CELLS TREATED WITH REPEATED DOSING OF EPIGALLOCATECHIN-3-GALLATE, THYMOQUINONE, OR 5 – FLUOROURACIL

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ABSTRACT

Nasopharyngeal carcinoma (NPC) is a malignancy arising from the epithelium of the nasopharynx. Ethnic background, being exposed to the Epstein Barr virus, and increased alcohol use are risk factors for the development of NPC. The majority of patients are diagnosed when the cancer has spread beyond the local area. Radiation therapy, chemotherapy, and surgery are options for treating NPC and are dependent upon location and stage of the disease. Although NPC is a radiosensitive tumor, long-term survival for patients with advanced disease remains poor. The goal of this study was to determine if natural products (thymoqunione (TQ) and Epigallo-catechin-3-gallate (EgCg)) when given by continuous delivery methods rather than a single dose method would destroy cells over a shorter period of time than conventional delivery. The FaDu squamous cell carcinoma cell line was used to test repeated doses of natural (EgCg and TQ) drugs to determine if repeated doses would be as effective at destroying cancer cells as repeated doses of a known chemotherapeutic (5-FU) drug. Cells were treated repeatedly with IC_{50} concentrations of EgCg, TQ, and 5-FU at 24, 48, and 72 hours. Cells showed similar levels of cellular reduction at 72 hours. Increases in cellular membrane damage were observed in all treated groups with a significant difference seen in 5-FU treated cells compared to EgCg and TQ treated cells. Nitric oxide levels increased in a time dependent manner in EgCg and TQ treated groups. Overall, EgCg and TQ were proved they are as effective as 5-FU in cellular reduction and disrupting cellular function.

Keywords: FaDu, EgCg, TQ, 5-FU, cell reduction, cellular damage, cellular function

INTRODUCTION

Nasopharyngeal carcinoma (NPC) is a carcinoma that begins in squamous cells found in the tissue that forms the surface of the skin and the passages of the respiratory and digestive tracts. The symptoms of NPC mimic other illnesses such as the common cold which increases the probability of misdiagnosis and often leads to diagnosis at advanced stages when the cancer has spread throughout the body. There are poor outcomes and low survival rates with the current treatments, and reoccurrence of cancer after treatment is high. There are three mainstream treatments for NPC: radiotherapy, chemotherapy, and surgery. The three treatments are often used in combinations. Chemotherapy or radiotherapy is the primary treatment of NPC. Surgery is often the last treatment to be used for NPC and only when it is practical. Chemotherapy is the first line of treatment for cancers discovered at advanced stages. It is used to decrease the bulk of the disease. 5-Fluorouracil (5-FU) is the most widely used to treat NPC.

5-Fluorouracil (5-FU) is one of the oldest chemotherapeutic drugs and it is often co-administered with other chemotherapeutic agents to manage solid tumors [1]. 5-Fluorouracil is an anti-metabolite which inhibits the formation of thymidylate from uracil in the S phase of the cell cycle leading to inhibition of