The Preventive Effect of Carotenoids on DMBA Induced Oral Carcinoma in Male Hamster

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Abstract

This study was designed to evaluate the oral cancer prevention ability and safety of single or combined carotenoids, including β-carotene, lycopene, lutein, and α-tocopherol (0.5% in mineral oil) in a hamster cheek pouch model. Forty-six hamsters were divided into six experimental groups and treated with 0.5% experimental agents. Over a 14-week experimental period, the tested groups received either DMBA or antioxidant mineral oil solutions three times per week on alternate days. At the end of the experiment, the pouches of each group were sampled, routinely processed for paraffin sections, and evaluated by a senior pathologist. The results indicated that the control group presented a 75% incidence of tumors (papilloma and squamous cell carcinoma), with ulceration on the buccal inner surface. The common phenotype of the neoplasia induced by DMBA included papilloma and squamous cell carcinoma. In the carotenoid chemoprevention tests, the carotenoid and vitamin E mixture group presented the most effective oral cancer prevention. The lutein group demonstrated less prevention ability. The other groups presented inconsistent results for oral carcinoma prevention. According to the inhibitory number and average volume (mm3) of tumors by the treated carotenoids, the results indicated that the carotenoids and vitamin mixture group represented the most effective prevention, followed by α-tocopherol, lycopene, β-carotene, and lutein. The four different antioxidants (carotenoids & vitamin E) significantly inhibited the incidence of oral cancer when administrated alone as well in mixtures of antioxidants. The ability of different antioxidants to inhibit the amount and average volume of the induced tumors was different. This may be because the carotenoids and α-tocopherol inhibited different developmental stages of cancer.