

# Chemopreventive effect of *Mentha piperita* on dimethylbenz[a]anthracene and formaldehyde-induced tongue carcinogenesis in mice . Histological and immunohistochemical study

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**Aim:** Since preventing or treating oral premalignant lesions with natural or synthetic chemical agents is now the most promising approach to prevent oral cancer, this study was held to investigate the protective and anticancer effect of *Mentha* leaves extract on oral epithelium of mice tongues through histological assessment as well as immunohistochemical expression of apoptotic marker, caspase 3.

## Materials and methods

**A-Animals:** 80 adult male Egyptian albino mice (6–8 weeks old weighing 25±2 g) were divided into: **Group I (control)** animals did not receive any treatment, **Group II** :36 animals had their tongues painted with DMBA and formol 3 days/week. **Group III** : 36 animals received ME at the same time of administration of dimethylbenz[a]anthracene DMBA and formol. Twelve mice from groups II and III were euthenized ethically at 3-, 6-, and 9-week intervals.

**B-Induction of squamous cell carcinogenesis** Through the two-stage chemical carcinogenesis : The dorsal and ventral surfaces of tongues of the animals were painted with 0.5% dimethylbenz[a]anthracene DMBA in acetone 3 days/week After 9 days 10% formaldehyde/water was used side by side with DMBA for another 3 days/week.

**C-Preparation of Mentha Extract (ME)** *Mentha piperita* fresh leaves were collected locally, and placed at Phytochemistry Department, Egyptian National Research Centre. -(1 kg) of these leaves were washed, air-dried, powdered, and extracted with 5:l of double-distilled water (DDW) by refluxing for 36 h at 80°C to produce viscous water extract. -The extract was dissolved in DDW just before the oral administration. **The dose was adjusted as 1 gm ME/1 kg body weight/day administrated by oral gavage for 3 days/week.** D-Histological assessment of tissue changes with routine H&E stain. E-F-Immunohistochemical evaluation of the anticancer effect of ME through anti-caspase antibody immunostain

**Conclusion:** The oral administration of an aqueous extract of *Mentha piperita* has reduced the dysplastic changes within the tongue epithelium with 61% and inhibited tumor incidence with 100%. ME has inhibited the initiation and promotion of oral dysplastic lesions. The aqueous extracts of *Mentha piperita* leaves can act as a potential natural anticancer agent inducing cellular apoptosis through the upregulation of caspase 3 expression.

## Introduction

Cancer chemoprevention is defined as the use of chemicals or dietary components to block, inhibit, or reverse the development of cancer in normal or pre-neoplastic tissues.

The use of complementary and alternative medicine, such as herbal extracts, is becoming increasingly popular among patients with cancer which emphasizes the use of whole extracts from a plant mix or from complex formulations.

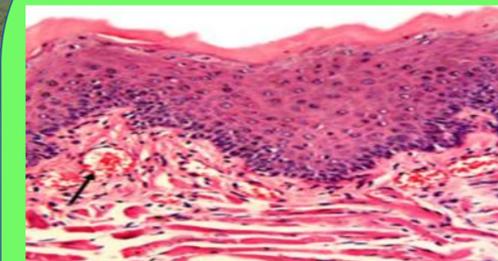
**Peppermint *Mentha piperita*** has a long history of safe use, both in medicinal preparations and as a flavoring agent.

## Results:

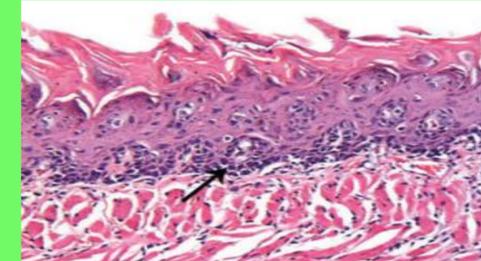
**At 6 weeks**

**Group II**

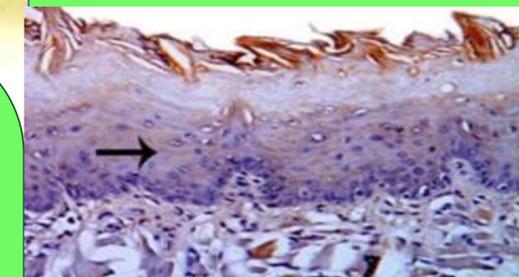
**Group III**



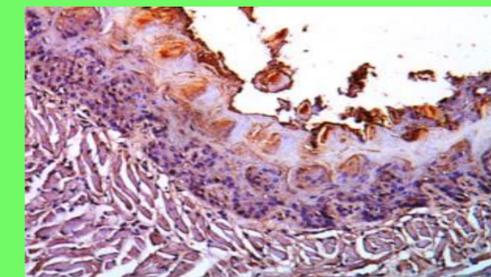
Signs of epithelial dysplasia



Signs of epithelial dysplasia

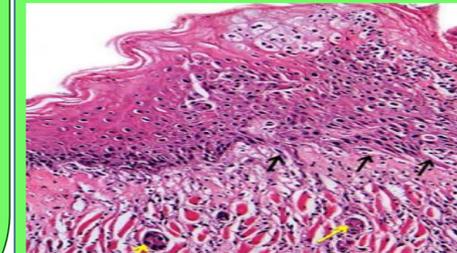


Mild to moderate caspase 3 expression

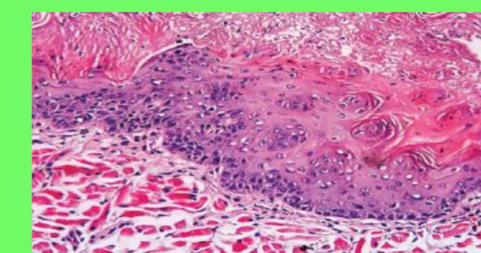


Moderate to strong caspase 3 expression

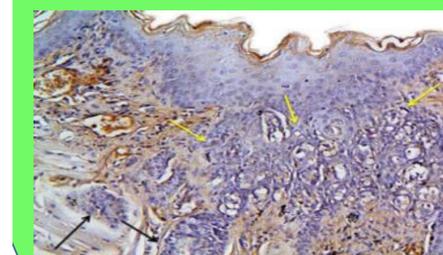
**At 9 weeks**



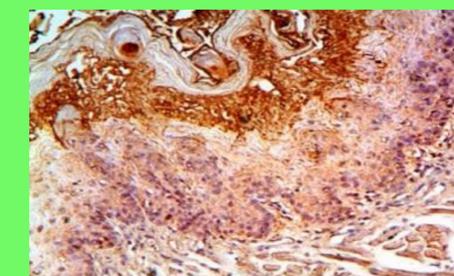
Invasion of dysplastic cells into connective tissue



Signs of epithelial dysplasia



Negative caspase expression



Strong caspase 3 expression

