

## Potentiality of essential oils in atherosclerosis prevention, hypercholesterolemia treatment and tumor diseases

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Epidemiological studies have revealed that a high intake of fruits and vegetables correlates with a reduction in cancer incidence and is today promoted as an effective mean of eliminating problems caused by hyperlipemia. Although numerous reports of phytochemicals with antitumoral and hypolipidemic activity provide grounds for promoting the intake of fruits and vegetables their chemotherapeutic effects and mechanisms of action have not yet been elucidated

Our studies were centered on the evaluation of the effects and action mechanisms of the monoterpenes components of essential oils and their combination with simvastatin on cholesterologenesis, lipid metabolism and cellular proliferation *in vitro* using two established cell lines, Hep G2 (derived from a human hepatoblastoma) and A549 (derived from a human lung adenocarcinoma) and *in vivo* in non host and host nude mice carrying implanted tumors derived from A549.

Recently we have been focus on the effects and action mechanisms of essential oils. We evaluated *Lippia alba* essential oils (LaEO) chemotypes cytotoxicity on human cancer culture cells and investigated the mechanisms involved in tagetenone (ta) chemotype (LaEOta) cytotoxicity. It exhibited significant cytotoxicity against human hepatic and pulmonary carcinoma cells and showed potential selectivity towards malignant cells. Cytotoxic mechanism of LaEOta with HepG2 and A549 cells involved cell cycle arrest and apoptosis induction. LaEOta treatment caused 3-hydroxy-3-methylglutaryl-coenzyme A reductase decrease and profound cholesterologenesis inhibition with farnesyl pyrophosphate redirection towards other end products, such as ubiquinone. The LaEOta, the most efficacious hypocholesterogenic LaEO, also inhibited triacylglycerols, cholesteryl esters, and phospholipids synthesis; and diminished lipid droplets in size and volume. Our work contributes to a clearer understanding of mechanisms of action of LaEOta, thus suggesting that the use of this chemotype could provide significant health benefits as a chemopreventive and/or chemotherapeutic agent and their lipid-lowering effects could prove essential to prevent cardiovascular diseases.

We also demonstrate that the peel oil of mandarin *Citrus reticulata* (MPO) causes a dose-dependent growth inhibition of non-small cell lung cancers model cells (A549) in culture and tumor growth *in vivo* of these same cells implanted in nude mice fed with MPO-supplemented diets. Our data suggest that MPO possesses significant antitumor activity without causing systemic toxicity, rendering it a useful tool as a functional food supplement.