Cytotoxicity of *Citrus aurantium L.ssp.bergamia*'s Essential Oil on Tumor Cells

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Introduction: Essential oils are complex natural mixtures of terpenoid, phenolic, and isoprenoid molecules, many of which have been shown cytotoxic, anti-proliferative and antioxidant activity against specific cancer cell lines both *in vivo* and *in vitro*. Limonene, one of the main constituents of many essential oils (namely citrus oils) has been shown to sensitize cancer cells to the effects of some established anticancer drugs when used by itself and to elicit cytotoxicity through apoptotic and necrotic death phenotypes when administered with linaly acetate, another major constituent of citrus essential oils. **Objectives:** Demonstrate the cytotoxic and cell death-inducing properties of bergamot (*Citrus aurantium* L. ssp. *bergamia*) peel essential oil against cancer cell lines. **Material and Methods**: We tested (1) cytotoxicity effects of the essential oil on tumor cells lines A2058, B16F10-Nex2.2 and K562 by flow cytometry and cell viability quantification techniques, (2) oxidant properties using DPPH radical scavenging assay and lipid peroxidation test on biomimetic membrane system and (3) changes in membrane potential using isolated mitochondria. **Results and Discussion:** We found that SAOS-2 was the most resistant of the tested cell lines. Exposure of K562 cells to bergamot essential oil for 24 hours ellicited a significant increase of hypodiploid cells as demonstrated by flow cytometry analysis with propidium iodide staining. Furthermore, mitochondrial membrane potential analysis of the same cell line showed a significant decrease in membrane potential after 24 hours of treatment. Bergamot essential oil showed potent antioxidant activity and was shown to readily interact with membrane phospholipids, reducing lipid peroxidation under *t*-BuOOH-induced oxidative stress in a membrane model system. **Conclusions:** Bergamot essential oil has scavenger properties, pro and antioxidant effects in different conditions and cytotoxicity effect on tumor cell lines, affecting cell division cycle and mitochondrial membrane potential. **Key words:** bergamot essential oil, cytotoxicity, cell death, cancer. **Acknowledgements:** FAPESP, CNPq and FAEP.