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A Cross Sectional Analysis of Published Studies for Essential Oils in the Treatment of Melanoma

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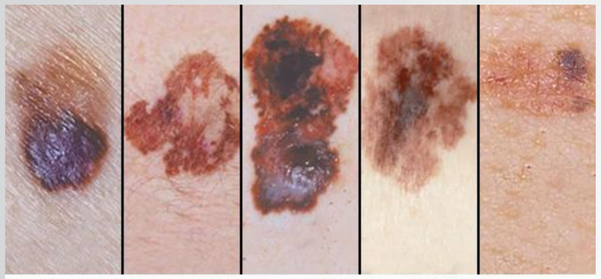
Introduction

- Melanoma is a prevalent form of skin cancer found in melanin-producing cells (melanocytes) caused by ultraviolet (UV) radiation leading to uncontrolled cell growth.



Disease Conditions of Melanoma
Photo Courtesy: Mayo Clinic
https://www.mayoclinic.org/diseases-condition

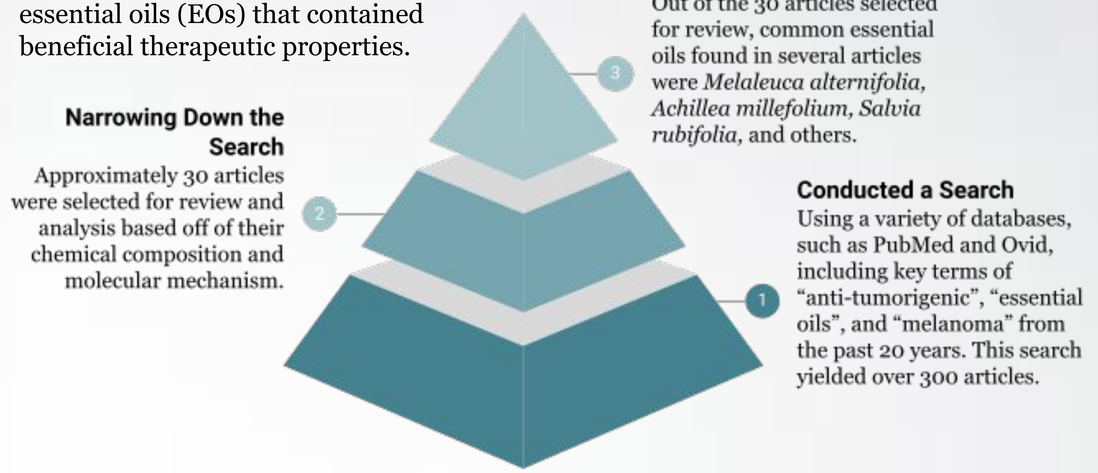
- Current Melanoma treatments include chemotherapy and radiation, both of which are risky procedures that have side effects and negatively impact a patient's quality of life.
- Drug therapies of Melanoma include Antineoplastic Agents such as Ipilimumab (Yervoy®), Nivolumab (Opdivo®), and Dabrafenib (Tafinlar®), these therapies have been shown to be quite expensive.
- Recently, the use of essential oils (EOs) has become a form of alternative therapy for melanoma treatment due to the wide array of chemical compounds that reduce inflammation, inhibit proliferation, induce apoptosis, and/or prevent melanogenesis.

Purpose

- The intention of this comprehensive and systematic review was to identify EOs that possess therapeutic effects on melanoma cells.
- These EOs could be considered as a possible adjuvant or alternative therapy to enhance treatment efficiency and quality of life in Melanoma patients.

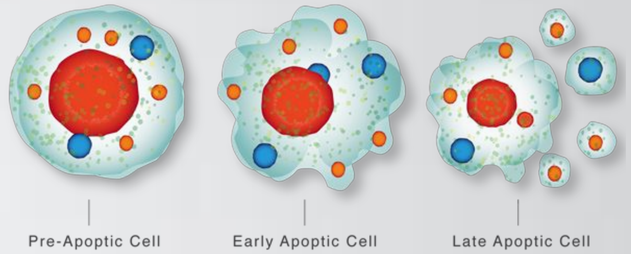
Methods

- A systematic review was conducted, as shown in the diagram illustrated below. It incorporated searches from databases to perform a retrospective analysis on many EOs.
- The search results were narrowed down to 30 research articles using various techniques, including *in vitro*, *in vivo*, and gas chromatography, with a variety of essential oils (EOs) that contained beneficial therapeutic properties.
- Out of the 30 articles, a cross-sectional analysis was performed to identify three common essential oils:
  - *Melaleuca alternifolia*
  - *Achillea millefolium*
  - *Salvia rubifolia*



Results

- Based on the collection of EO therapeutic properties and benefits, we selected three EOs commonly found within several articles: *Melaleuca alternifolia*[1] , *Achillea millefolium*[2], and *Salvia rubifolia*[3].
- Each of these three EOs demonstrated different characteristics leading to several therapeutic effects in the treatment of Melanoma cells.
- *Melaleuca alternifolia*[1] and *Salvia rubifolia*[3] EOs both induced apoptosis in the human Melanoma cell lines tested.
- *Achillea millefolium*[2] showed to inhibit melanogenesis in the human Melanoma cell lines tested.



Identification of Apoptosis Cells
Photo Courtesy: Journal of Cytology and Histology
DOI: 10.4172/2157-7099.1000309

Results

	Melaleuca Alternifolia (Common Name: Tea Tree Oil)	***Achillea millefolium*** (Common Name: Yarrow)	***Salvia rubifolia***
Cell Lines	Human Melanoma M14 WT cells M14 adriamycin-resistant cells HEp-2 melanoma cell lines	Human Melanoma M14 cells SK-MEL Variants	Human Melanoma M14 cells
Molecular Mechanism	Caspase cytotoxicity induced apoptosis P53 upregulation, providing tumor suppression Pax Gene Inhibition, decreasing the growth of melanoma tissues BCL-2 downregulation induced inhibition of cell cycle phases G2 and M	Targets BRAF mutation of melanoma cells to inhibits melanogenesis Resulted in antiproliferative, anti-inflammatory, anti-angiogenic, and anti-metastatic effects	Induced apoptosis, releasing LDH and cytotoxic substrates into surrounding medium DNA damage shown by increased TDNA and TMOM concentrations from COMET assay
Major Constituents	Terpinen-4-ol (42.35%) G-terpinene (20.65%) A-terpinene (9.76%) Terpinolene (3.71%)	Artemisia ketone (14.92%) Camphor (11.64%) Linalyl acetate (11.51%) 1,8-cineole (10.15%)	Gamma-muurolene (11.8%) 1-epi-cubenol (3.7%) trans-pinocarvyl acetate (5.5%) (alpha)-thujone (5.1%)

Conclusion

- In conclusion, the results of our cross sectional analysis showed that EOs can possess therapeutic effects on melanoma cells as an alternative or adjunct therapy to current treatments.
- The results collected in this study will contribute insight into potential EO formulations that can be considered as a form of treatment for melanoma compared to today's current therapies.
- Future analysis will be performed on collected EOs to determine the most predominant qualities of decreasing inflammation and the apoptosis of melanoma cells.

References

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