THE SCIENCE BEHIND ESSENTIAL OILS

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PROFESSIONAL DISCLOSURE

I have no personal or professional affiliation with any of the resources listed in this presentation, and will receive no monetary gain or professional advancement from this lecture.

I am a Wellness Advocate for an Essential Oil Company.

TALK OBJECTIVES

Describe	• Describe how essential oils have been used for centuries as pharmacological agents
Increase	• Increase your understanding of the chemical composition of essential oils and how they are extracted for pharmacologic use
Discuss	• Discuss how oils can be used internally, aromatically, and topically.
Illustrate	• Illustrate the chemical make-up, medicinal uses, and potential clinical application of TEA TREE, CLARY SAGE, COPAIBA, VETIVER, OREGANO, LEMON, MELISSA, AND LAVENDER.


Plants love us.
They help us reclaim our health
and our whole selves.
Plants are healers.
Robin Rose Bennett

WHAT ARE ESSENTIAL OILS?

- Plants are able to synthesize two kinds of oils: fixed oils and essential oils
  - Fixed oils are esters of glycerol and fatty acids
  - Essential oils are mixtures of volatile, organic compounds that originate from a single botanical source. These oils create the flavor and fragrance of the plant
- Called “essential” because they are the essence of the plant
- It is also believed that in the Middle Ages essential oils were “essential” to life
- In Modern times essential oils are defined as the essence, or extract, of the plant’s aroma or flavor.
  - Ex. Lavender smells like Lavender because of the oil contained within the plant

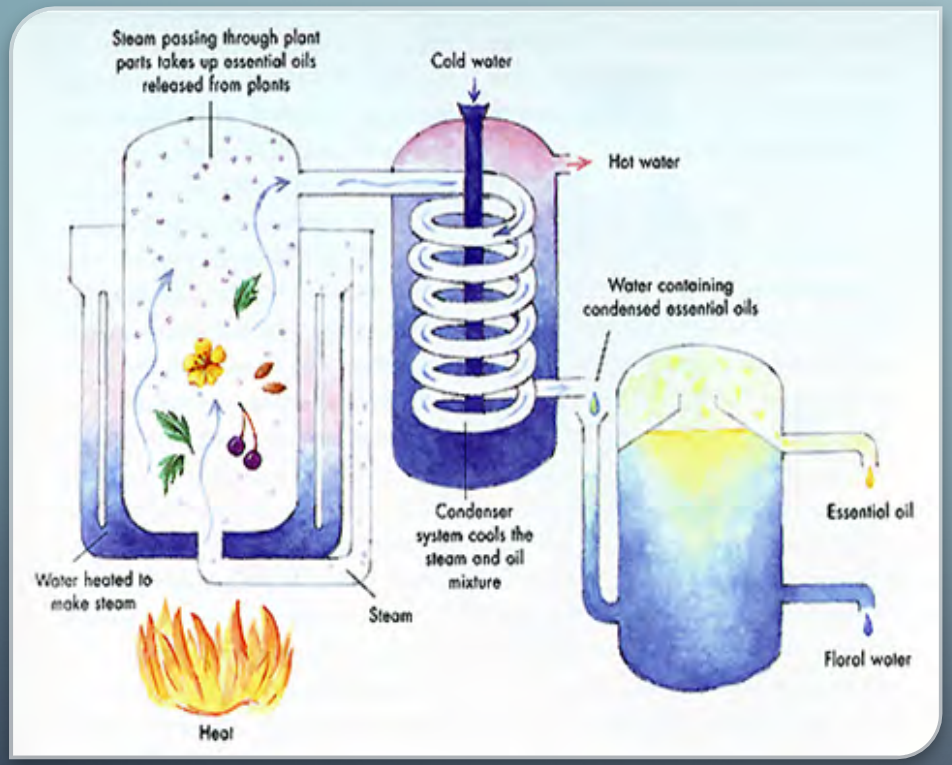
WHY DO PLANTS PRODUCE ESSENTIAL OILS?

- Essential oils are produced as a part of the plants immune system, playing a critical role in protection against environmental threats.
  - Attract Insects
  - Repel Competition
  - Protect
  - Defend & Protect: Provide Immunity
- Those parts of the plants with the greatest amounts of essential oils are generally the areas that are at the highest risk for an invasion by microorganisms. This may be the bark, sap, leaves, seeds, or fruit rinds.

PRODUCTION METHODS

- Distillation: Scent & Steam
- Distillation vs. Extraction
- Steam Distilled
- Water Distilled
- Cold Pressing
- Extraction

STEAM DISTILLED



- Distillation: method of evaporating leading to the condensing of liquids
  - Can be performed through very simple means in the fields where the plant is harvested
  - Ability to process large amounts of plant material in a short period of time
  - Highly flammable solvents are not required
- Steam Distilled:
  - Principle of a two-phase distillation as opposed to a regular one-phase distillation
  - Steam is injected into the dry plant material. Due to the very high temperatures those constituents of the plant that have a very high boiling point are extracted
  - This method is almost exclusively used for the industrial production of essential oils.

STEPS OF STEAM DISTILLATION

1) Steam is created from the boiling point
2) The steam passes through the plants biomass, breaking up the plant micro-particles
3) This process separates the *volatile* from the *non-volatile* organic compounds, both rise with the steam
4) A condenser is used to cool the steam, thus transforming it back into water
5) The *volatile* principles (i.e. essential oils) rise to the top through the use of a separator and are then extracted
6) The residual water contains the *non-volatile* principles, or floral waters (i.e. hydrosols)which can be used for body care products and also contain medicinal properties
7) The essential oils are then tested for purity

WATER DISTILLED

- Plant material is placed in a still and is completely covered in water
- The entire still is brought to a boil
- Continues to be a method used for very high quality oils as it is performed at reduced pressure and temperature as compared to steam distillation

COLD PRESSING

- The most gentle form of extraction
- Used exclusively to prepare citrus oils
- Peels are separated from the fruits and then cold pressed
- The essential oil is collected with mall amounts of juice and then seperatated

EXTRACTION

- Used on raw materials that have a low concentration of essential oils
- Best method for isolating fragrant constituents
- Solvent Extraction
- Enfleurage

PURITY

- Essential oils may be adulterated by extending it with another essential oil that has similar composition
- It is difficult to detect
- 3 simple tests:
  a) Additional of vegetable oil is the most common way to extend an essential oil creating a *greasy* feel when applied. PURE essential oils do not feel greasy. Apply a small amount to your thumb and rub together with you index finger, it should feel smooth not greasy.
  b) Place a drop of essential oil on a sheet of plain, white paper. A pure oil will completely evaporate and leave no residue, an extended will leave a lasting, oily stain on the paper.
  c) Essential oils used for cosmetic purposes sometimes use surfactants and /or emulsifiers, although they claim to be 100% pure. Place 1 drop into water, pure essential oils do not dissolve in water, they float to the top as they are lighter than water. Emulsified dissolve in the water producing a milky white or opaque solution.

QUALITY

- Pure, natural, and complete
- Genuine and authentic
- Natural vs. Synthetic

"A truly genuine and authentic essential oil should always be guaranteed in three respects: the plant, the distillation process, and the essential oil itself."

-Kurt Schnaubelt, Ph. D.

LABELING

100%
Natural

100%
Pure

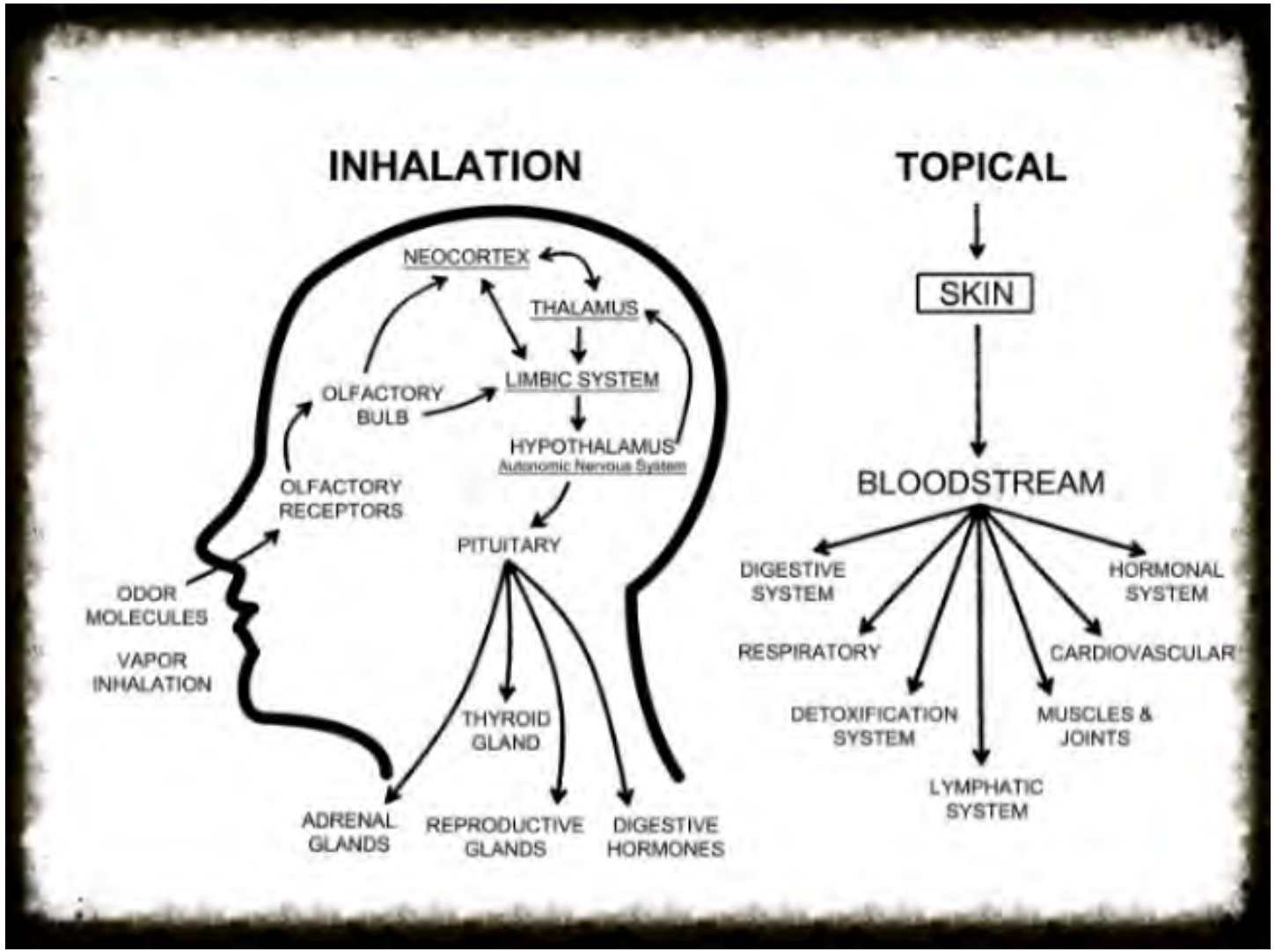
100%
Complete

USAGE OF ESSENTIAL OILS

Aromatically

Internally

Topically



SMELL

Strong connection between scent and psychological response

Research demonstrates that basil, lemon, and peppermint are stimulating while bergamot and sandalwood are relaxing

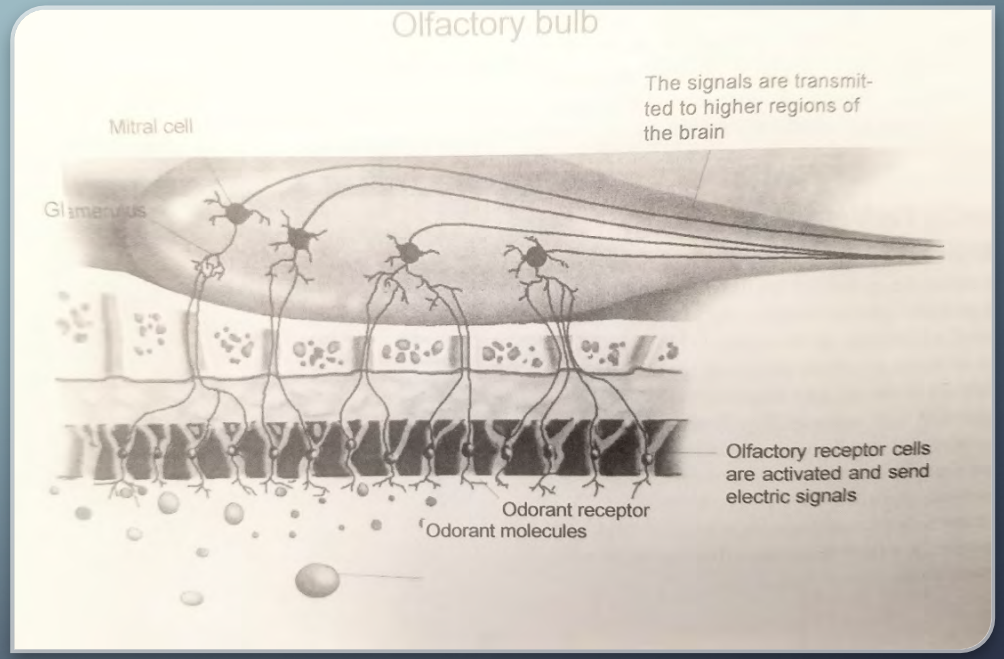
More than 1000 genes code the types of olfactory receptors in our nose

Receptors are located on the tips of the olfactory receptor cells

These receptors are positioned on the upper part of the nasal lining

The body can smell and remember approximately 10,000 smells

An odor molecule stimulates an odor receptor, which in turn activates the olfactory receptor cell. An electronic impulse is created, then relayed to the glomeruli, then transmitted to the higher regions of the brain, this signals a response



AROMATICALLY

- Direct inhalation
- Diffusion
- Steam Inhalation

TOPICALLY

In as little as 5-20 minutes the essential oil is carried into the blood stream, carried to the lungs, and exhaled through the breath. Essential oils are also eliminated through the skin and urine.

The term “neat”: can be applied without any dilution

Dilute: Essential oils which should be diluted ith a carrier oil every time

Sensitive: Require dilution before applying to more sensitive skin such as young children and the elderly.

Carrier Oil: an oil that literally acts as a carries the essential oil to the desired area, ex. Fractionated coconut oil, avocado oil, jojoba oil

INTERNALLY

In their 1930 publication *Useful Drugs* the American Medical Association listed certain oils for oral use.

Pure oils were used for decades in the food and drink industry for flavorings.

FDA has created a Generally Recognized As Safe (GRAS) list that provides the names of essential oils that are deemed as safe for internal use

CONSTITUENTS:

HYDROCARBONS & OXYGENATED COMPOUNDS

Terpenes Hydrocarbons
- Monoterpene
- Sesquiterpene

Oxygenated Compounds
- Phenols
- Alcohols
  - Monoterpene alcohols
  - Sesquiterpene alcohols

Aldehydes

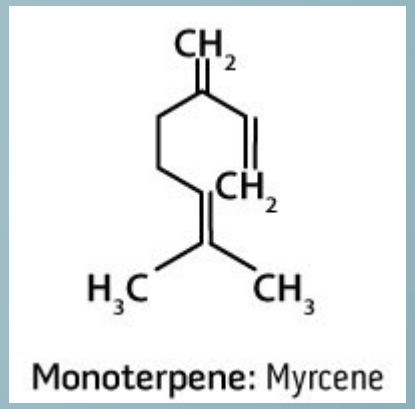
Ketones

Esters

Ethers

Oxides

MONOTERPENE



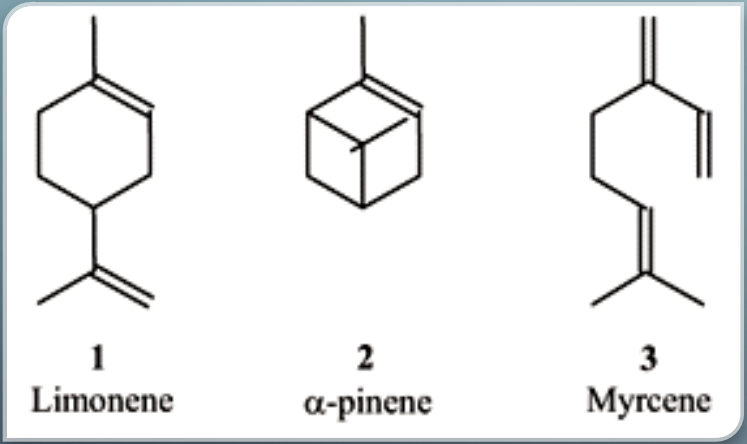
Monoterpene: Myrcene

- Found in nearly all essential oils
- Structure of 10 carbon atoms and at least 1 double bond
- The carbon atoms are derived from two isoprene units
- React readily to air and heat sources
- Example: LEMON

MAIN CHEMICAL COMPONENTS: LIMONENE, S pinenes, Γ-TERPIMENE:

LEMON ESSENTIAL OIL IS EXTRACTED FROM THE LEMON RINDS, OR PEEL OF THE LEMON. THE LEMON RINDS ARE COLD PRESSED TO PRODUCE LEMON ESSENTIAL OIL. AN EXPRESSION DISTILLATION PROCESS, COLD PRESSING IS TYPICALLY USED FOR CITRUS OILS WHEN PRODUCING ESSENTIAL OILS, AND USES HIGH MECHANICAL PRESSURE TO PRODUCE OIL FROM THE LEMON RIND.

LEMON



History

- Lemon trees are native to Asia, they may have arrived in Europe in the Middle Ages around 200 A.D. English sailors in the Royal Navy used them to protect against vitamin deficiencies given their known benefits as an antiseptic and anti-bacterial agent
- Used for thousands of years in Ayurvedic Medicine.

Botanical Name: *Citrus x limon L.*

Botanical synonym: *Citrus limonum* Risso

Family: Rutaceae

Source: Fruit peel, by expression

Key Constituents:

(+)-Limonene

β-*pinene*

MEDICINAL USE & CLINICAL APPLICATION

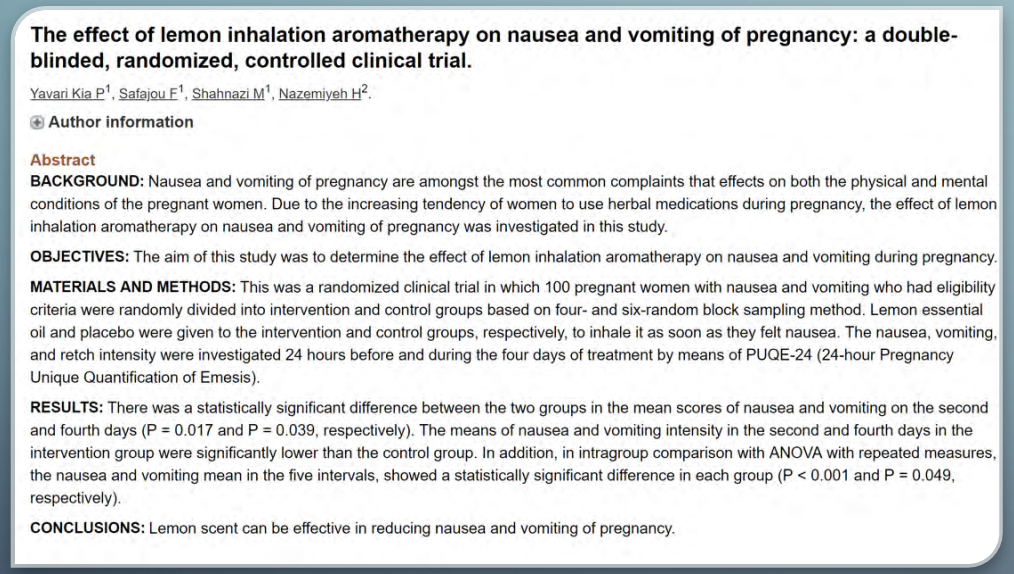
- Antiseptic-like properties
- Contains compounds studied for their effect on immune function
- Limonene slightly inhibits Phase 1 liver detoxification enzymes, thus induces Phase 2 enzymes.
- Selectively inhibits reproduction of tumor cells through the inhibition of HMG CoA reductase

*** this same process occurs when we eat citrus fruits or use Lemon Essential Oil***

- May serve as insect repellent
- May be beneficial to the skin
- May reduce nausea and vomiting in pregnancy (inhalation)

CITRUS OILS SHOULD NOT BE APPLIED TO SKIN THAT WILL BE EXPOSED TO DIRECT SUNLIGHT OR ULTRAVIOLET LIGHT WITHIN 72 HOURS

LEMON RESEARCH



The effect of lemon inhalation aromatherapy on nausea and vomiting of pregnancy: a double-blinded, randomized, controlled clinical trial.

Yavari Kia P[1], Safajou F[1], Shahnazi M[1], Nazemiyeh H[2].

Author information

Abstract

BACKGROUND: Nausea and vomiting of pregnancy are amongst the most common complaints that effects on both the physical and mental conditions of the pregnant women. Due to the increasing tendency of women to use herbal medications during pregnancy, the effect of lemon inhalation aromatherapy on nausea and vomiting of pregnancy was investigated in this study.

OBJECTIVES: The aim of this study was to determine the effect of lemon inhalation aromatherapy on nausea and vomiting during pregnancy.

MATERIALS AND METHODS: This was a randomized clinical trial in which 100 pregnant women with nausea and vomiting who had eligibility criteria were randomly divided into intervention and control groups based on four- and six-random block sampling method. Lemon essential oil and placebo were given to the intervention and control groups, respectively, to inhale it as soon as they felt nausea. The nausea, vomiting, and retch intensity were investigated 24 hours before and during the four days of treatment by means of PUQE-24 (24-hour Pregnancy Unique Quantification of Emesis).

RESULTS: There was a statistically significant difference between the two groups in the mean scores of nausea and vomiting on the second and fourth days ($P = 0.017$ and $P = 0.039$, respectively). The means of nausea and vomiting intensity in the second and fourth days in the intervention group were significantly lower than the control group. In addition, in intragroup comparison with ANOVA with repeated measures, the nausea and vomiting mean in the five intervals, showed a statistically significant difference in each group ($P < 0.001$ and $P = 0.049$, respectively).

CONCLUSIONS: Lemon scent can be effective in reducing nausea and vomiting of pregnancy.

The effect of lemon inhalation aromatherapy on nausea and vomiting of pregnancy: a double-blinded, randomized, controlled clinical trial.

https://www.ncbi.nlm.nih.gov/pubmed/?term=lemon+essential+oil+nausea+and+vomiting

The effect of lemon, orange and bergamot essential oils and their components on the survival of Campylobacter jejuni, Escherichia coli O157, Listeria monocytogenes, Bacillus cereus and Staphylococcus aureus in vitro and in food systems.

https://www.ncbi.nlm.nih.gov/pubmed/17105553

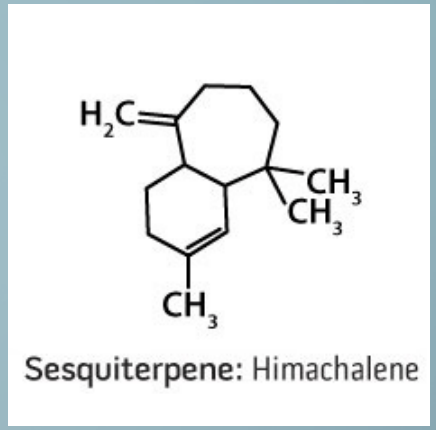
Effects of sub-minimum inhibitory concentrations of lemon essential oil on the acid tolerance and biofilm formation of Streptococcus mutans.

https://www.ncbi.nlm.nih.gov/pubmed/29331510

Induction of apoptosis in human cervical carcinoma HeLa cells by polymethoxylated flavone-rich Citrus grandis Osbeck (Dangyuja) leaf extract.

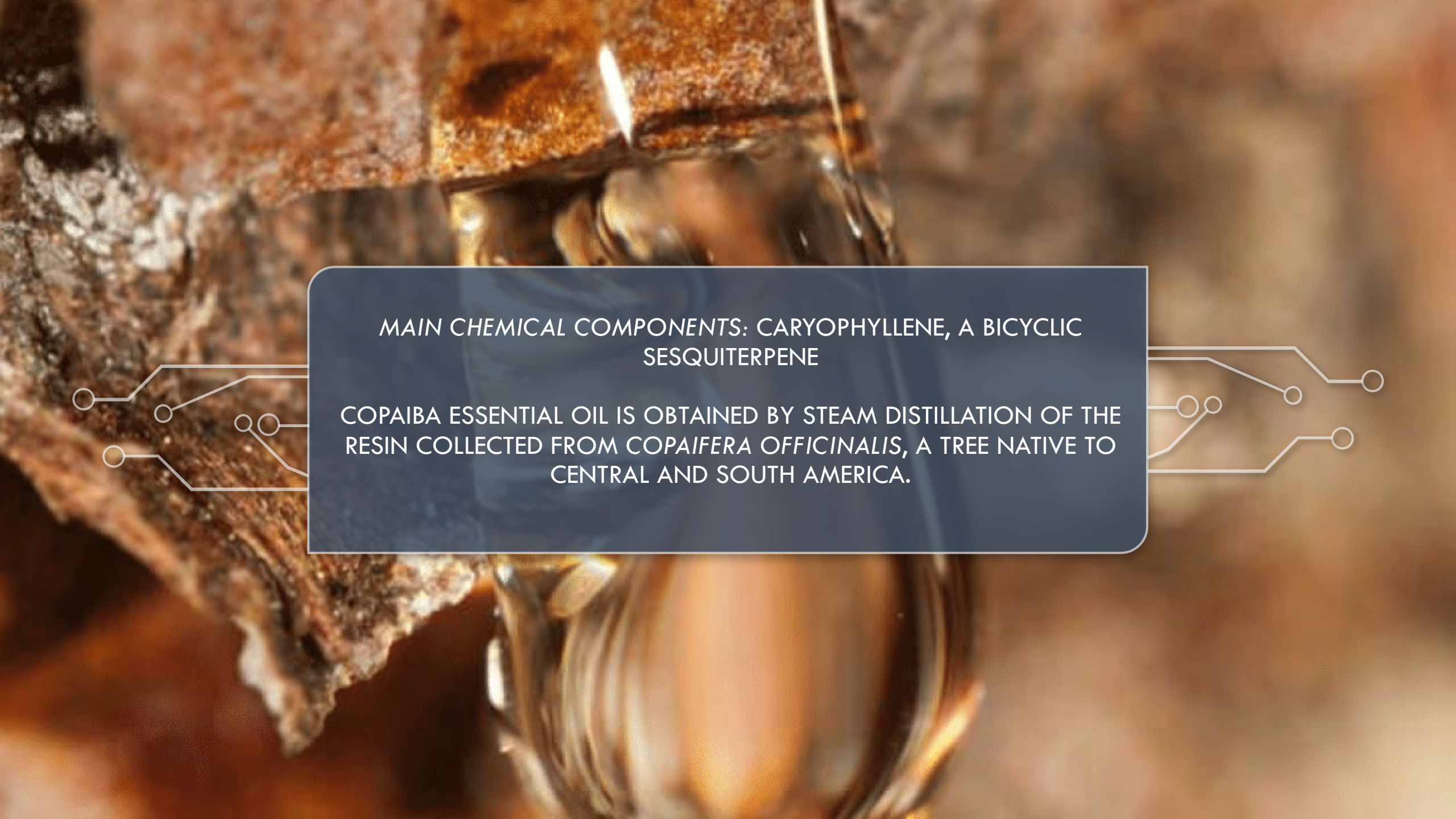
https://www.ncbi.nlm.nih.gov/pubmed/20538032

SESQUITERPENE



Sesquiterpene: Himachalene

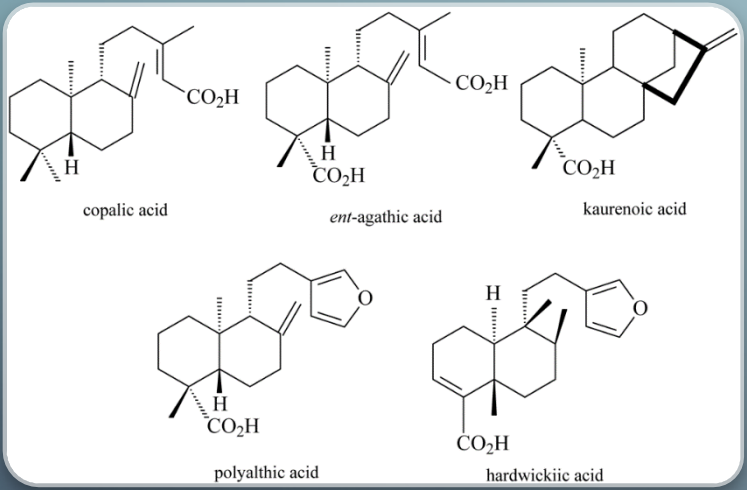
- Work as a liver and gland stimulant
- Contain caryophyllene and valencene
- Composed of 15 carbon atoms derived from 3 isoprene unit
- Less volatile than Monoterpenes
- Example: Copaiba



MAIN CHEMICAL COMPONENTS: CARYOPHYLLENE, A BICYCLIC SESQUITERPENE

COPAIBA ESSENTIAL OIL IS OBTAINED BY STEAM DISTILLATION OF THE RESIN COLLECTED FROM *COPAIFERA OFFICINALIS*, A TREE NATIVE TO CENTRAL AND SOUTH AMERICA.

COPAIBA



History

- Used since the16th century by native and traditional medical practitioners in its native Brazil and throughout South America
- Harvested from the trunk of the *Copaifera* tree. The essential oil is the distilled resin of the tree

Botanical Name: *Copaifera langsdorfii, Copaifera officinalis*

Family: Fabaceae

Source: Balsam from wood

Key Constituents:

β-*Caryophyllene*

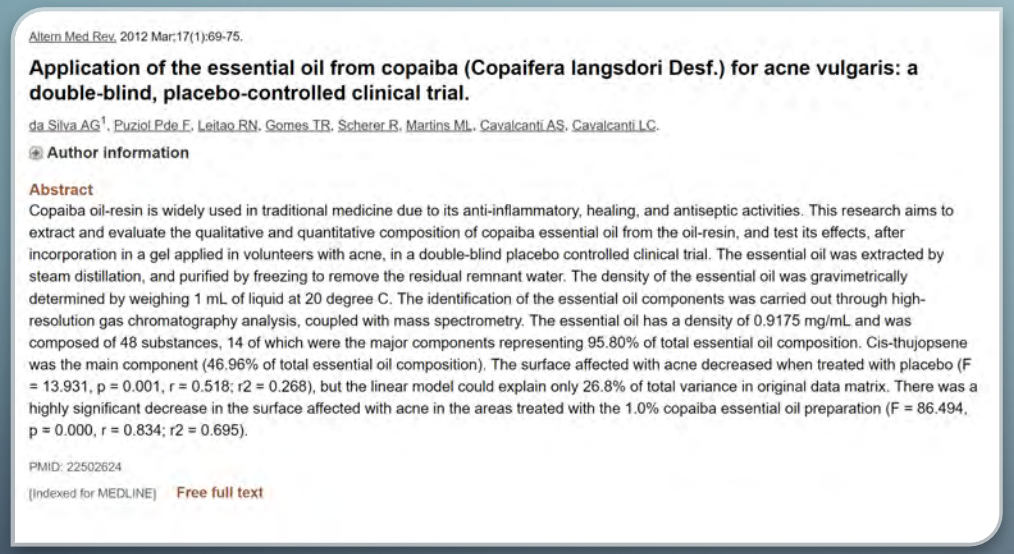
Germacrene B

Has no known hazards or contraindications

MEDICINAL USE & CLINICAL APPLICATION

- Bicyclic sesquiterpene beta-caryophyllene has the ability to bind to CB2 receptors
- beta-caryophyllene has been known to be a cannabinoid
- Activation of CB2 receptors
- Thus supports healthy nervous and immune function
- Copaiba essential oil is composed of more than 50% beta-caryophyllene
- As an anti-oxidant
- To support the nervous system
- For the treatment of acne
- Wound and scar healing

COPAIBA RESEARCH



Altern Med Rev. 2012 Mar;17(1):69-75.

Application of the essential oil from copaiba (Copaifera langsdori Desf.) for acne vulgaris: a double-blind, placebo-controlled clinical trial.

da Silva AG[1], Puziol Pde F, Leitao RN, Gomes TR, Scherer R, Martins ML, Cavalcanti AS, Cavalcanti LC.

Author information

Abstract

Copaiba oil-resin is widely used in traditional medicine due to its anti-inflammatory, healing, and antiseptic activities. This research aims to extract and evaluate the qualitative and quantitative composition of copaiba essential oil from the oil-resin, and test its effects, after incorporation in a gel applied in volunteers with acne, in a double-blind placebo controlled clinical trial. The essential oil was extracted by steam distillation, and purified by freezing to remove the residual remnant water. The density of the essential oil was gravimetrically determined by weighing 1 mL of liquid at 20 degree C. The identification of the essential oil components was carried out through high-resolution gas chromatography analysis, coupled with mass spectrometry. The essential oil has a density of 0.9175 mg/mL and was composed of 48 substances, 14 of which were the major components representing 95.80% of total essential oil composition. Cis-thujopsene was the main component (46.96% of total essential oil composition). The surface affected with acne decreased when treated with placebo ($F = 13.931$, $p = 0.001$, $r = 0.518$; $r2 = 0.268$), but the linear model could explain only 26.8% of total variance in original data matrix. There was a highly significant decrease in the surface affected with acne in the areas treated with the 1.0% copaiba essential oil preparation ($F = 86.494$, $p = 0.000$, $r = 0.834$; $r2 = 0.695$).

PMID: 22502624

[Indexed for MEDLINE] Free full text

Application of the essential oil from copaiba (Copaifera langsdori Desf.) for acne vulgaris: a double-blind, placebo-controlled clinical trial.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Application+of+the+essential+oil+from+copaiba+(Copaifera+langsdori+Desf.)+for+acne+vulgaris%3A+a+double-blind%2C+placebo-controlled+clinical+trial%2C

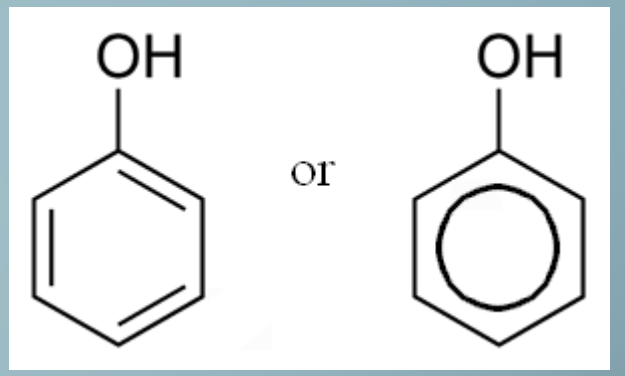
Antibacterial Combination of Oleoresin from Copaifera multijuga Hayne and Biogenic Silver Nanoparticles Towards Streptococcus agalactiae.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Antibacterial+combination+of+oleoresin+from+Copaifera+multijuga+Hayne+and+biogenic+silver+nanoparticles+towards+Streptococcus+agalactiae

Antimicrobial Activity of Copaiba (Copaifera officinalis) and Pracaxi (Pentaclethra macroloba) Oils against Staphylococcus Aureus: Importance in Compounding for Wound Care.

https://www.ncbi.nlm.nih.gov/pubmed/27125055

PHENOLS

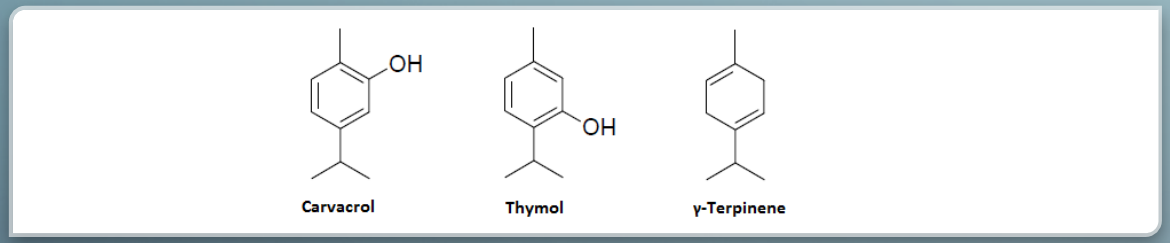


- Subtype of alcohols
- An alcohol group (an oxygen and a hydrogen) attached to a benzene ring
- Benzene ring= has six carbon atoms arranged in a hexagon pattern with 3 double bonds inside the ring
- Hepato-toxicity
- Example: Oregano

MAIN CHEMICAL COMPONENTS: CARVACROL, THYMOL , PARA-CYMENE, Γ-TERPINENE

ORIGANUM VULGARE, IS A BUSHY PERENNIAL THAT IS PART OF THE LAMIACEAE FAMILY. THE LEAVES OF THE PLANT ARE FRAGRANT AND ARE CHARACTERIZED BY THEIR ROUNDED TO OVATE SHAPE. IT THRIVES IN FULL SUN. THE OIL IS EXTRACTED FROM THE LEAVES OF THE PLANT.

OREGANO



History

- Used since the16th century by native and traditional medical practitioners in its native Brazil and throughout South America
- Harvested from the trunk of the *Copaifera* tree. The essential oil is the distilled resin of the tree

Botanical Name: *Origanum onites* L.; *Origanum vulgare* L. subsp. *hirtum; Thymbra capitatus*

Family: Lamaiceae

Source: Dried aerial parts of the flowering plant

Key Constituents:

Carvacrol

p-Cymene

γ-Terpinene

Contraindicated in pregnancy and breastfeeding, caution with topical use if hypertensive, sensitive skin, and children under the age of 2.

MEDICINAL USE & CLINICAL APPLICATION

- Main chemical component is carvacrol which contains warming properties
- Antiseptic properties due to carvacrol
- As a phenol oregano also has beneficial antioxidant effects
- Antiseptic
- Anti-bacterial
- Contain high levels of oxygenating molecules and have antioxidant properties
- Carvacrol may help support the body's normal immune response to inflammatory stressor
- May promote gastrointestinal health

OREGANO RESEARCH

Oxid Med Cell Longev. 2016; 2016: 1404505.
Published online 2016 Mar 9. doi: 10.1155/2016/1404505
PMCID: PMC4804097
PMID: 27051475

Antioxidant, Antibacterial, and Cytotoxic Activities of the Ethanolic *Origanum vulgare* Extract and Its Major Constituents

John Coccimiglio,[1] Misagh Alipour,[2] Zi-Hua Jiang,[3] Christine Gottardo,[3] and Zacharias Suntres[1,3,4,*]

Author information ► Article notes ► Copyright and License information ► Disclaimer

Abstract Go to:

Oregano is a perennial shrub that grows in the mountains of the Mediterranean and Euro/Irano-Siberian regions. This study was conducted to identify the major constituents of the ethanolic *Origanum vulgare* extract and examine the cytotoxic, antioxidant, and antibacterial properties of the extract but more importantly the contribution of its specific major constituent(s) or their combination to the overall extract biological activity. Gas chromatography/mass spectroscopy analysis showed that the extract contained monoterpene hydrocarbons and phenolic compounds, the major ones being carvacrol and thymol and to a lesser extent p-cymene, 1-octacosanol, creosol, and phytol. A549 epithelial cells challenged with the extract showed a concentration-dependent increase in cytotoxicity. A combination of thymol and carvacrol at equimolar concentrations to those present in the extract was less cytotoxic. The A549 cells pretreated with nonlethal extract concentrations protected against hydrogen-peroxide-induced cytotoxicity, an antioxidant effect more effective than the combination of equimolar concentrations of thymol/carvacrol. Inclusion of p-cymene and/or 1-octacosanol did not alter the synergistic antioxidant effects of the carvacrol/thymol mixture. The extract also exhibited antimicrobial properties against Gram-positive and Gram-negative bacterial strains including clinical isolates. In conclusion, the oregano extract has cytotoxic, antioxidant, and antibacterial activities mostly attributed to carvacrol and thymol.

Antimicrobial activity of carvacrol: current progress and future prospectives.

https://www.ncbi.nlm.nih.gov/pubmed/22044355

Antioxidant and Antimicrobial Activities of Essential Oils Obtained from Oregano (*Origanum vulgare* ssp. *hirtum*) by Using Different Extraction Methods

http://online.liebertpub.com/doi/abs/10.1089/jmf.2010.0098

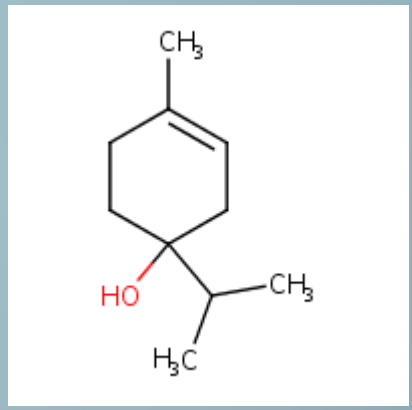
Chemical composition and bioactivity of different oregano (Origanum vulgare) extracts and essential oil.

https://www.ncbi.nlm.nih.gov/pubmed/23553824

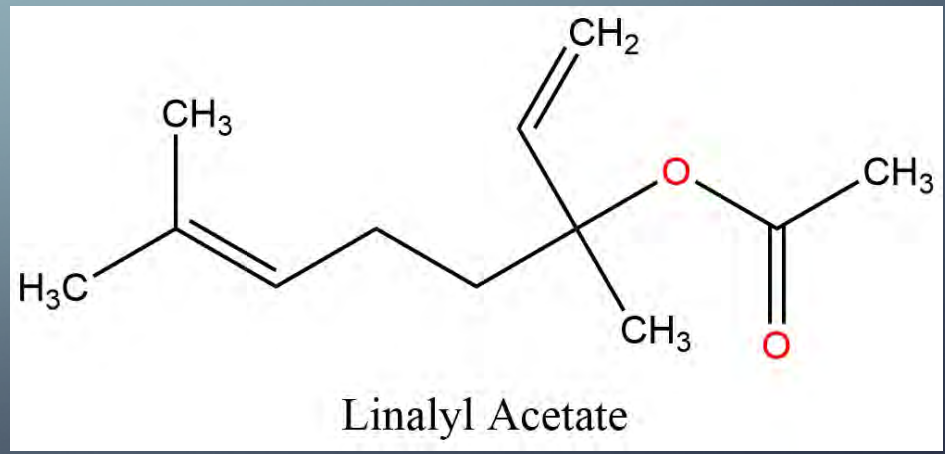
Antioxidant, Antibacterial, and Cytotoxic Activities of the Ethanolic *Origanum vulgare* Extract and Its Major Constituents

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4804097/

MONOTERPENE ALCOHOLS



- Any molecule with an alcohol functional group
- An oxygen atom bound to both the carbon backbone on one end and a hydrogen atom on the other end
- Example: Tea Tree and Lavender



***MAIN CHEMICAL COMPONENTS:* LINALOOL, LINALYL ACETATE**

A SHORT SHRUB THAT GROWS TO BE ROUGHLY 2 FEET TALL, LAVENDER IS NATIVE TO THE MEDITERRANEAN. THE DISTINCT, FRESH SCENT OF LAVENDER COMES FROM THE PLANT'S FLOWERS, WHICH IS WHERE THE ESSENTIAL OIL IS EXTRACTED FROM. AFTER EXTRACTION, LAVENDER ESSENTIAL OIL IS PRODUCED THROUGH THE PROCESS OF STEAM DISTILLATION.

LAVENDER

History

- The name lavender comes from the Latin root *lavare*, which means "to wash."
- There is documented use of Lavender for more than 2500 years.
- Used in cosmetics in Egypt, in Greece and Rome as an antiseptic, and ingested internally during the Middle Ages.
- Prior to World War 1 Lavender essential oil was only produced from wild plants grown in the French and Italian Alps

Botanical Name: *Lavandula angustifolia*

Family: Lamaiceae

Source: Flowering Tops

Key Constituents:

Linalyl actetate

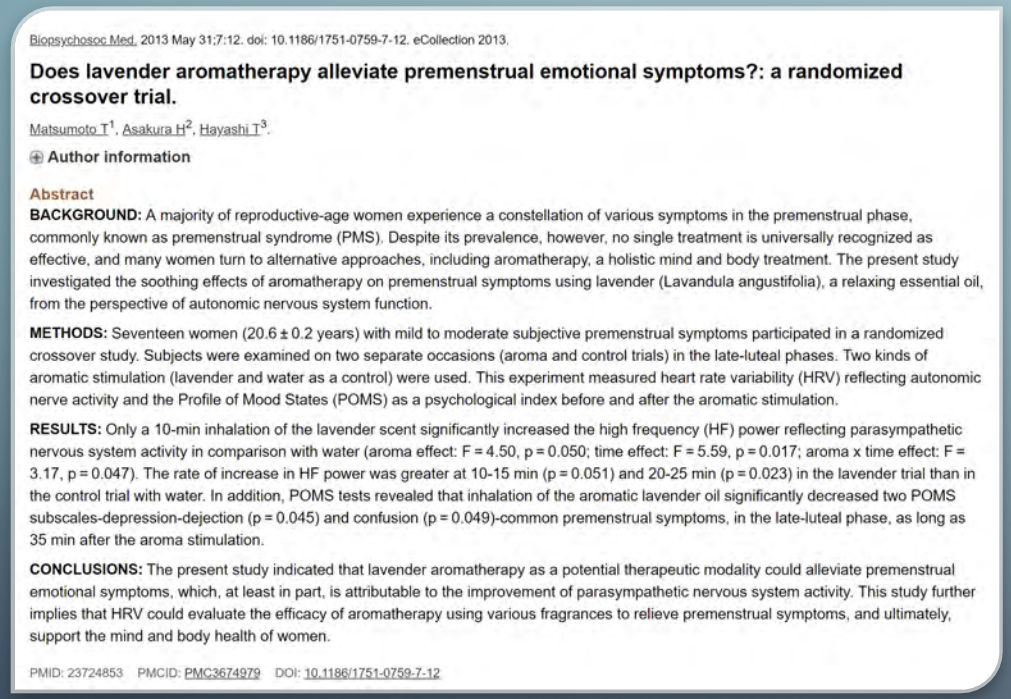
Linalool

Non-toxic, low risk of skin sensitivityNo known contraindications

MEDICINAL USE & CLINICAL APPLICATION

- Linolool inhibits HMG CoA reductase (antitumor, antifungal), reduces spasms, is anticonvulsant, and modifies autonomic nervous system activity
- Linalool may activate biochemical pathways in the endothelial lining of the blood vessels, thus relaxing the underlying vascular smooth muscle.
- Lavender's nerve-calming effects may be due to its ability to modulate NMDA receptors
- May alleviate premenstrual emotional symptoms Anti-bacterial
- May decrease stress and enhance immune function in pregnant women
- Useful in managing insomnia
- Active against *Staphylococcus aureas, Klebsiella, and Candida albicans* making it a beneficial essential oil for a variety of skin conditions

LAVENDER RESEARCH



Biopsychosoc Med. 2013 May 31;7:12. doi: 10.1186/1751-0759-7-12. eCollection 2013.

Does lavender aromatherapy alleviate premenstrual emotional symptoms?: a randomized crossover trial.

Matsumoto T[1], Asakura H[2], Hayashi T[3].

⊕ Author information

Abstract

BACKGROUND: A majority of reproductive-age women experience a constellation of various symptoms in the premenstrual phase, commonly known as premenstrual syndrome (PMS). Despite its prevalence, however, no single treatment is universally recognized as effective, and many women turn to alternative approaches, including aromatherapy, a holistic mind and body treatment. The present study investigated the soothing effects of aromatherapy on premenstrual symptoms using lavender (Lavandula angustifolia), a relaxing essential oil, from the perspective of autonomic nervous system function.

METHODS: Seventeen women (20.6 ± 0.2 years) with mild to moderate subjective premenstrual symptoms participated in a randomized crossover study. Subjects were examined on two separate occasions (aroma and control trials) in the late-luteal phases. Two kinds of aromatic stimulation (lavender and water as a control) were used. This experiment measured heart rate variability (HRV) reflecting autonomic nerve activity and the Profile of Mood States (POMS) as a psychological index before and after the aromatic stimulation.

RESULTS: Only a 10-min inhalation of the lavender scent significantly increased the high frequency (HF) power reflecting parasympathetic nervous system activity in comparison with water (aroma effect: $F = 4.50$, $p = 0.050$; time effect: $F = 5.59$, $p = 0.017$; aroma x time effect: $F = 3.17$, $p = 0.047$). The rate of increase in HF power was greater at 10-15 min ($p = 0.051$) and 20-25 min ($p = 0.023$) in the lavender trial than in the control trial with water. In addition, POMS tests revealed that inhalation of the aromatic lavender oil significantly decreased two POMS subscales-depression-dejection ($p = 0.045$) and confusion ($p = 0.049$)-common premenstrual symptoms, in the late-luteal phase, as long as 35 min after the aroma stimulation.

CONCLUSIONS: The present study indicated that lavender aromatherapy as a potential therapeutic modality could alleviate premenstrual emotional symptoms, which, at least in part, is attributable to the improvement of parasympathetic nervous system activity. This study further implies that HRV could evaluate the efficacy of aromatherapy using various fragrances to relieve premenstrual symptoms, and ultimately, support the mind and body health of women.

PMID: 23724853 PMCID: PMC3674979 DOI: 10.1186/1751-0759-7-12

Does lavender aromatherapy alleviate premenstrual emotional symptoms?: a randomized crossover trial.

https://www.ncbi.nlm.nih.gov/pubmed/23724853

Effects of Aromatherapy Massage on Pregnant Women's Stress and Immune Function: A Longitudinal, Prospective, Randomized Controlled Trial.

https://www.ncbi.nlm.nih.gov/pubmed/28783372

Inhaled lavender effect on anxiety and pain caused from intrauterine device insertion.

https://www.ncbi.nlm.nih.gov/pubmed/?term=lavender+iud

Antinociceptive and gastroprotective effects of inhaled and orally administered Lavandula hybrida Reverchon "Grosso" essential oil.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Antinociceptive+and+gastroprotective+effects+of+inhaled+and+orally+administered+Lavandula+hybrida+Reverchon+Grosso+essential+oil

Linalool Affects the Antimicrobial Efficacy of Essential Oils.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Linalool+Affects+the+Antimicrobial+Efficacy+of+Essential+Oils

Effect of Inhaled Lavender and Sleep Hygiene on Self-Reported Sleep Issues: A Randomized Controlled Trial.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Effect+of+lavender+and+sleep+hygiene+on+self-reported+sleep+issues%3A+A+randomized+controlled+trial.

Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Ambient+odors+of+orange+and+lavender+reduce+anxiety+and+improve+mood+in+a+dental+office.

Effect of lavender aroma on salivary endocrinological stress markers.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Effect+of+lavender+aroma+on+salivary+endocrinological+stress+markers.

MAIN CHEMICAL COMPONENTS: TERPINEN-4-OL, Y-TERPINENE

MELALEUCA OIL, OR TEA TREE OIL, IS EXTRACTED FROM THE LEAVES OF MELALEUCA SHRUBS OR TREES, WHICH HAVE A STRONG AROMA WHEN RUBBED. MELALEUCA ESSENTIAL OIL IS PRODUCED THROUGH THE PROCESS OF STEAM DISTILLATION.

TEA TREE

History

- Used by the Aboriginal people of Australia for centuries
- “Discovered” by British explorer Captain James Cook (1728- 1779) on his travels around the world
- Used in military first aid kits during World War II
- Classed as a necessary commodity in Australia

Botanical Name: *Melaleuca alternifolia*

Family: Myrtaceae

Source: Leaves

Key Constituents:

Terpinen-4-ol

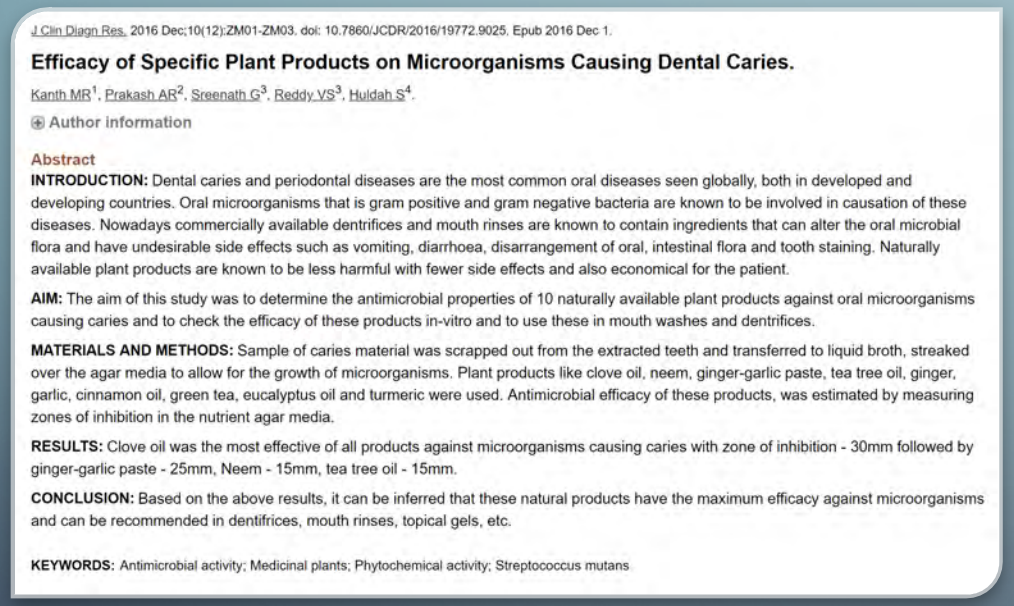
y-Terpinene

Non-toxic, low risk of skin sensitivity.

MEDICINAL USE & CLINICAL APPLICATION

- Terpinen-4-ol has a strong 5 carbon bond which is chemically resilient against bacteria, it prevents bacteria from reproducing
- The water-soluble components of tea tree oil can suppress pro-inflammatory mediator production by activated human monocytes.
- Terpinen-4-ol and alpha-terpineol can suppress the production of inflammatory mediators in LPS-stimulated human macrophage
- Potent topical antiseptic, known as a anti-fungal, antiviral and antibacterial aid
- May be effective at reducing the appearance of skin concerns
- Likely has a place in oral hygiene to keep teeth, gums, and mouth clean and free of disease

TEA TREE RESEARCH



J Clin Diagn Res. 2016 Dec;10(12):ZM01-ZM03. doi: 10.7860/JCDR/2016/19772.9025. Epub 2016 Dec 1.

Efficacy of Specific Plant Products on Microorganisms Causing Dental Caries.

Kanth MR[1], Prakash AR[2], Sreenath G[3], Reddy VS[3], Huldah S[4].

Author information

Abstract

INTRODUCTION: Dental caries and periodontal diseases are the most common oral diseases seen globally, both in developed and developing countries. Oral microorganisms that is gram positive and gram negative bacteria are known to be involved in causation of these diseases. Nowadays commercially available dentrifices and mouth rinses are known to contain ingredients that can alter the oral microbial flora and have undesirable side effects such as vomiting, diarrhoea, disarrangement of oral, intestinal flora and tooth staining. Naturally available plant products are known to be less harmful with fewer side effects and also economical for the patient.

AIM: The aim of this study was to determine the antimicrobial properties of 10 naturally available plant products against oral microorganisms causing caries and to check the efficacy of these products in-vitro and to use these in mouth washes and dentrifices.

MATERIALS AND METHODS: Sample of caries material was scrapped out from the extracted teeth and transferred to liquid broth, streaked over the agar media to allow for the growth of microorganisms. Plant products like clove oil, neem, ginger-garlic paste, tea tree oil, ginger, garlic, cinnamon oil, green tea, eucalyptus oil and turmeric were used. Antimicrobial efficacy of these products, was estimated by measuring zones of inhibition in the nutrient agar media.

RESULTS: Clove oil was the most effective of all products against microorganisms causing caries with zone of inhibition - 30mm followed by ginger-garlic paste - 25mm, Neem - 15mm, tea tree oil - 15mm.

CONCLUSION: Based on the above results, it can be inferred that these natural products have the maximum efficacy against microorganisms and can be recommended in dentifrices, mouth rinses, topical gels, etc.

KEYWORDS: Antimicrobial activity; Medicinal plants; Phytochemical activity; Streptococcus mutans

Influence of melaleuca and copaiba oils on Candida albicans adhesion.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Influence+of+melaleuca+and+copaiba+oils+on+Candida+albicans+adhesion

Melaleuca alternifolia **(Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1360273/

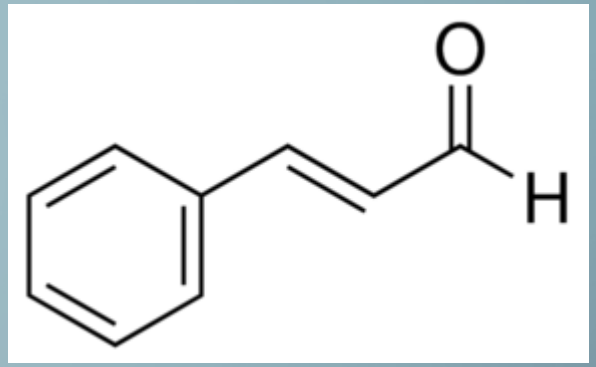
Plants of the Melaleuca Genus as Antimicrobial Agents: From Farm to Pharmacy.

https://www.ncbi.nlm.nih.gov/pubmed/28782167

Efficacy of Specific Plant Products on Microorganisms Causing Dental Caries.

https://www.ncbi.nlm.nih.gov/pubmed/28209019

ALDEHYDES



- Highly reactive
- Characterized by the group C-H-O (Carbon, Hydrogen, Oxygen)
- Anti-infectious with a sedative effect on the central nervous system
- Quite irritating when applied topically, calming effect when inhaled
- Example: cinnamon

MAIN CHEMICAL COMPONENTS: EUGENOL, EUGENOL ACETATE, CINNAMIC ALDEHYDE AND BENZYL BENZOATE

A NATIVE TO INDONESIA, BUT CULTIVATED IN SRI LANKA AND INDIA, THE TREE IS RUST-COLORED AND CAN GROW UP TO 15 METERS (45FEET). EXTRACTION: THE LEAVES AND TWIGS OR INNER DRIED BARK ARE SUBJECTED TO STEAM DISTILLATION

CINNAMON

History

- One of the oldest known aromatics
- Longest existing spices in the world
- Used for embalming purposes, medicine and incense throughout Egypt and for flavoring and as an aromatic in religious rites in Europe.

Botanical Name: *Cinnamomum verum* J. Presl.

Family: Lauraceae

Source: Leaves or Bark

Key Constituents:

Eugenol (leaf)

Eugenyl acetate

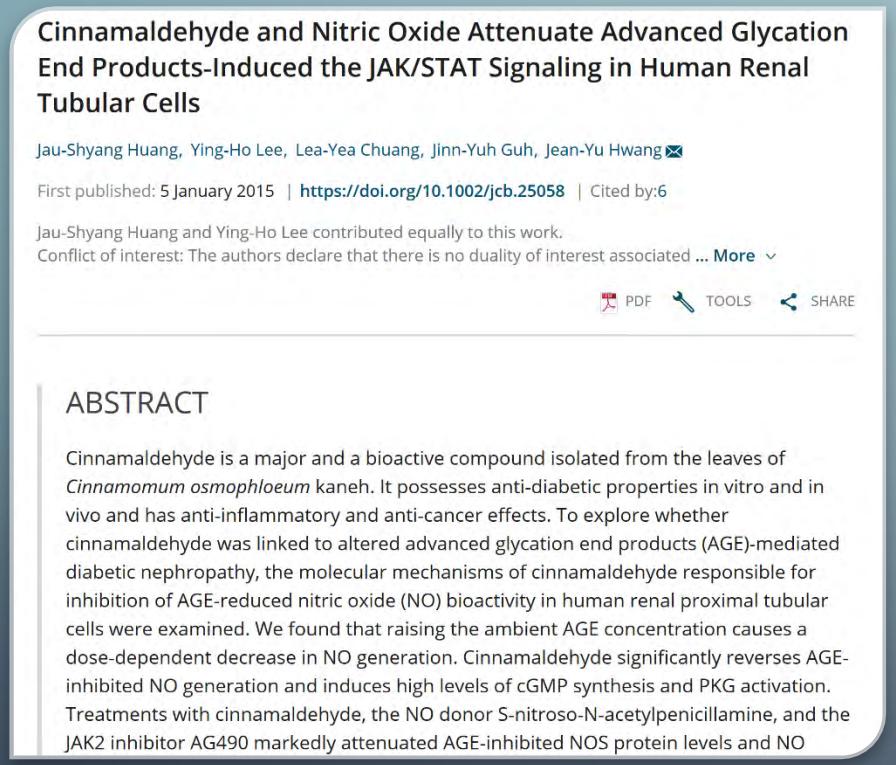
(*E*)-Cinnamaldehyde (bark)

High risk of skin sensitization, contraindicated in pregnancy and breastfeeding. Medication interaction must be considered.

MEDICINAL USE & CLINICAL APPLICATION

- Cinnamaldehyde, which is the main chemical constituent of Cinnamon Bark, may support healthy molecular function in the kidneys by inactivating the JAK2-STAT1/STAT3 biochemical pathway in the kidney cells
- Sirtuin-1 (Sirt-1), a deacetylase in the insulin signaling pathway is a possible target for cinnamon extract and may be why it has an antidiabetic effect.
- Anti-inflammatory properties of cinnamaldehyde have been shown to be caused by it's ability to block nuclear factor-κB activation in immune cells
- Anti-diabetic properties
- Patients may be using cinnamon as a dietary supplement for gastrointestinal issues or weight loss
- Frequently used as a spice

CINNAMON RESEARCH



Cinnamaldehyde and Nitric Oxide Attenuate Advanced Glycation End Products-Induced the JAK/STAT Signaling in Human Renal Tubular Cells

Jau-Shyang Huang, Ying-Ho Lee, Lea-Yea Chuang, Jinn-Yuh Guh, Jean-Yu Hwang

First published: 5 January 2015 | https://doi.org/10.1002/jcb.25058 | Cited by:6

Jau-Shyang Huang and Ying-Ho Lee contributed equally to this work.
Conflict of interest: The authors declare that there is no duality of interest associated ... More

PDF TOOLS SHARE

ABSTRACT

Cinnamaldehyde is a major and a bioactive compound isolated from the leaves of *Cinnamomum osmophloeum* kaneh. It possesses anti-diabetic properties in vitro and in vivo and has anti-inflammatory and anti-cancer effects. To explore whether cinnamaldehyde was linked to altered advanced glycation end products (AGE)-mediated diabetic nephropathy, the molecular mechanisms of cinnamaldehyde responsible for inhibition of AGE-reduced nitric oxide (NO) bioactivity in human renal proximal tubular cells were examined. We found that raising the ambient AGE concentration causes a dose-dependent decrease in NO generation. Cinnamaldehyde significantly reverses AGE-inhibited NO generation and induces high levels of cGMP synthesis and PKG activation. Treatments with cinnamaldehyde, the NO donor S-nitroso-N-acetylpenicillamine, and the JAK2 inhibitor AG490 markedly attenuated AGE-inhibited NOS protein levels and NO

Cinnamaldehyde and Nitric Oxide Attenuate Advanced Glycation End Products-Induced the JAK/STAT Signaling in Human Renal Tubular Cells

https://onlinelibrary.wiley.com/doi/abs/10.1002/jcb.25058

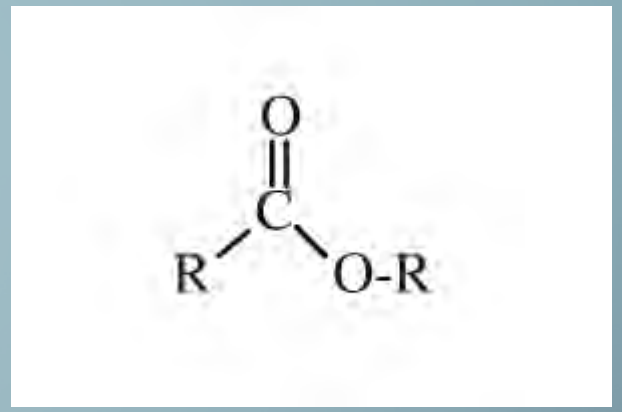
Cooperative binding of cinnamon polyphenols as activators of Sirtuin-1 protein in the insulin signaling pathway

http://www.fasebj.org/doi/abs/10.1096/fasebj.31.1_supplement.761.25

Immune Suppressive Effect of Cinnamaldehyde Due to Inhibition of Proliferation and Induction of Apoptosis in Immune Cells: Implications in Cancer

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4182734/

ESTERS



- Formed by the reaction of alcohols with acids
- Central carbon atom double bonded to an oxygen atom, single bonded to the backbone, and single bonded to a second oxygen atom
- Used extensively in flavorings and edible fruit aromas
- Activity against fungal overgrowth
- Example: Clary sage

MAIN CHEMICAL COMPONENTS: LINALYL ACETATE, LINALOOL

CLARY SAGE IS A BIENNIAL OR PERENNIAL HERB THAT IS FAST GROWING. CLARY SAGE ESSENTIAL OIL IS EXTRACTED FROM THE FLOWER.

CLARY SAGE

History

- In the Middle Ages Clary Sage was used to relieve a wide range of gynecological conditions including menstrual cramps, painful menstruation, and hot flashes
- Mentioned in herbalist Culpeper's 'Complete Herbal & English Physician' (1653), clary sage was referred to as 'clear eye' as after soaking the seeds form a thick mucilage that were used to remove foreign objects from the eye, draw out splinters and thorns from the skin, and reduce inflammation.
- Native to Southern Europe

Botanical Name: Muscatel sage

Family: Lamiaceae

Source: Leaves and flowering tops

Key Constituents:

Linalyl acetate

Linalool

Germacrene D

Non-toxic, Moderate risk of skin sensitization, No known contraindications.

MEDICINAL USE & CLINICAL APPLICATION

- Active against Staphylococcus aureus, S. epidermidis and S. xylosus
- Massage with Clary Sage provided relief for primary dysmenorrhea and reduced the duration of menstrual pain
- May be of benefit to women in menopause
- May be effective adjunct in the treatment of depression
- Shows promise as an antimicrobial agent

CLARY SAGE RESEARCH

Phytother Res. 2014 Nov;28(11):1599-605. doi: 10.1002/ptr.5163. Epub 2014 May 7.

Changes in 5-hydroxytryptamine and cortisol plasma levels in menopausal women after inhalation of clary sage oil.

Lee KB[1], Cho E, Kang YS.

Author information

Erratum in
Phytother Res. 2014 Dec;28(12):1897.

Abstract

The purpose of this study was to examine the antidepressant-like effects of clary sage oil on human beings by comparing the neurotransmitter level change in plasma. The voluntary participants were 22 menopausal women in 50's. Subjects were classified into normal and depression tendency groups using each of Korean version of Beck Depression Inventory-I (KBDI-I), KBDI-II, and Korean version of Self-rating Depression Scale. Then, the changes in neurotransmitter concentrations were compared between two groups. After inhalation of clary sage oil, cortisol levels were significantly decreased while 5-hydroxytryptamine (5-HT) concentration was significantly increased. Thyroid stimulating hormone was also reduced in all groups but not statistically significantly. The different change rate of 5-HT concentration between normal and depression tendency groups was variable according to the depression measurement inventory. When using KBDI-I and KBDI-II, 5-HT increased by 341% and 828% for the normal group and 484% and 257% for the depression tendency group, respectively. The change rate of cortisol was greater in depression tendency groups compared with normal groups, and this difference was statistically significant when using KBDI-II (31% vs. 16% reduction) and Self-rating Depression Scale inventory (36% vs. 8.3% reduction). Among three inventories, only KBDI-II differentiated normal and depression tendency groups with significantly different cortisol level. Finally, clary sage oil has antidepressant-like effect, and KBDI-II inventory may be the most sensitive and valid tool in screening for depression status or severity.

KEYWORDS: 5-HT; clary sage oil; cortisol; depression; neurotransmitter

PMID: 24802524 DOI: 10.1002/ptr.5163

[Indexed for MEDLINE]

Randomized controlled trial for Salvia sclarea or Lavandula angustifolia: differential effects on blood pressure in female patients with urinary incontinence undergoing urodynamic examination.

https://www.ncbi.nlm.nih.gov/pubmed/23360656

Changes in 5-hydroxytryptamine and cortisol plasma levels in menopausal women after inhalation of clary sage oil.

https://www.ncbi.nlm.nih.gov/pubmed/24802524

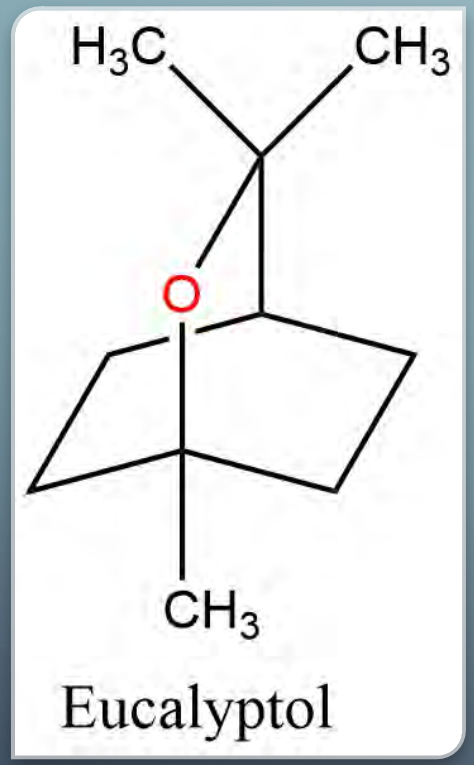
Antidepressant-like effect of Salvia sclarea is explained by modulation of dopamine activities in rats.

https://www.ncbi.nlm.nih.gov/pubmed/20441789

The effect of clary sage oil on staphylococci responsible for wound infections

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4360007/

ETHERS



- A molecule with an oxygen atom bonded between two carbons.
- The two flanking carbons MUST only have bonds with other carbons
- Ether eucalyptol or 1, 8-cineole is the most common ether found in essential oils
- Eucalyptole (usually redistilled or isolated) is widely used as an expectorant in many over-the-counter pharmaceuticals
- Example: eucalyptus

MAIN CHEMICAL COMPONENTS: EUCALYPTOL, ALPHA-TERPINEOL

THE EUCALYPTUS PLANT IS AN EVERGREEN TREE THAT CAN GROW UP TO 50 FEET IN HEIGHT. EUCALYPTUS LEAVES ARE THIN, LONG, AND GREEN IN COLOR. EUCALYPTUS ESSENTIAL OIL IS EXTRACTED FROM THE LEAVES.

EUCALYPTUS

History

- Originally grown in Australia and known by the native population of Australia as ‘kino’, used to cover wounds and assist in healing
- Introduced in Europe in 1788
- The first major use of Eucalyptus in the Industrialized world was as an antiseptic agent

Botanical Name: *Eucalyptus camaldulensis; Eucalyptus globulus; Eucalyptus maidenii; Eucalyptus plenissima; Eucalyptus polybractea; Eucalyptus radiata; Eucalyptus smithii*

Family: Myrtaceae

Source: Leaves

Key Constituents:

1, 8-Cineole

a-Pinene

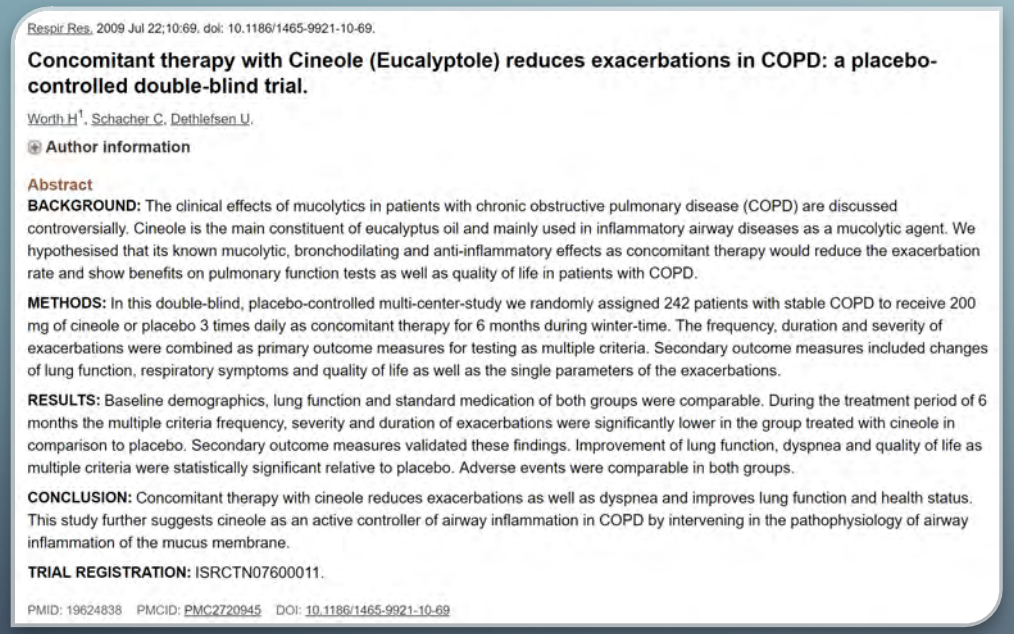
A-Terpineol

May cause breathing and CNS problems in young children. DO not apply near the face of an infant or children under the age of 10.

MEDICINAL USE & CLINICAL APPLICATION

- Eucalyptus is a mucolytic, and as such has bronchodilating and anti-inflammatory effects
- Broad-spectrum antimicrobial
- Application by inhalation or oral route provides benefit for purulent and non-purulent respiratory problems
- Eucalyptus oil has been shown in studies to significantly induced macrophage activation and reduce the release of inflammatory cytokines
- Used as an anti-inflammatory, anti-fungal, and antimicrobial agent
- Studies to demonstrate the efficacy of the use in Eucalyptus in the treatment of asthma and COPD are ongoing

EUCALYPTUS RESEARCH



Respir Res. 2009 Jul 22;10:69. doi: 10.1186/1465-9921-10-69.

Concomitant therapy with Cineole (Eucalyptole) reduces exacerbations in COPD: a placebo-controlled double-blind trial.

Worth H[1], Schacher C, Dethlefsen U.

Author information

Abstract

BACKGROUND: The clinical effects of mucolytics in patients with chronic obstructive pulmonary disease (COPD) are discussed controversially. Cineole is the main constituent of eucalyptus oil and mainly used in inflammatory airway diseases as a mucolytic agent. We hypothesised that its known mucolytic, bronchodilating and anti-inflammatory effects as concomitant therapy would reduce the exacerbation rate and show benefits on pulmonary function tests as well as quality of life in patients with COPD.

METHODS: In this double-blind, placebo-controlled multi-center-study we randomly assigned 242 patients with stable COPD to receive 200 mg of cineole or placebo 3 times daily as concomitant therapy for 6 months during winter-time. The frequency, duration and severity of exacerbations were combined as primary outcome measures for testing as multiple criteria. Secondary outcome measures included changes of lung function, respiratory symptoms and quality of life as well as the single parameters of the exacerbations.

RESULTS: Baseline demographics, lung function and standard medication of both groups were comparable. During the treatment period of 6 months the multiple criteria frequency, severity and duration of exacerbations were significantly lower in the group treated with cineole in comparison to placebo. Secondary outcome measures validated these findings. Improvement of lung function, dyspnea and quality of life as multiple criteria were statistically significant relative to placebo. Adverse events were comparable in both groups.

CONCLUSION: Concomitant therapy with cineole reduces exacerbations as well as dyspnea and improves lung function and health status. This study further suggests cineole as an active controller of airway inflammation in COPD by intervening in the pathophysiology of airway inflammation of the mucus membrane.

TRIAL REGISTRATION: ISRCTN07600011.

PMID: 19624838 PMCID: PMC2720945 DOI: 10.1186/1465-9921-10-69

Concomitant therapy with Cineole (Eucalyptole) reduces exacerbations in COPD: a placebo-controlled double-blind trial.

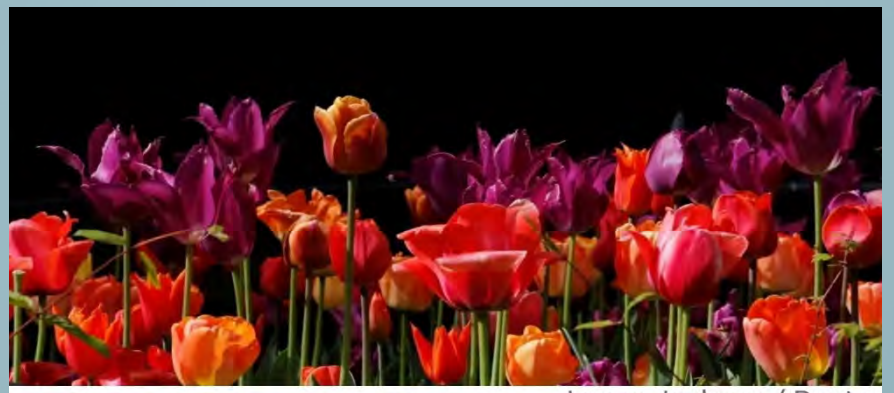
https://www.ncbi.nlm.nih.gov/pubmed/?term=Concomitant+therapy+with+Cineole+(Eucalyptole)+reduces+exacerbations+in+COPD%3A+a+placebo-controlled+double-blind+trial.

Patients with asthma benefit from concomitant therapy with cineole: a placebo-controlled, double-blind trial.

https://www.ncbi.nlm.nih.gov/pubmed/?term=Patients+with+asthma+benefit+from+concomitant+therapy+with+cineole%3A+a+placebo-controlled%2C+double-blind+trial

KETONES

- All ketones share the same functional group: the ketone or carboxyl group
- Most prominent feature is their mucolytic effect
- Ability to induce the formation of new cells and tissue
- Possibly neurotoxic when isolated from constituents
- Example: Spikenard



Lucas Jackson / Reuter

Essential Oils Might Be the New Antibiotics

Faced with increasingly drug-resistant bacteria, scientists and farmers are now looking to plant extracts to keep people and animals healthy.

TORI RODRIGUEZ

JAN 16, 2015 | HEALTH

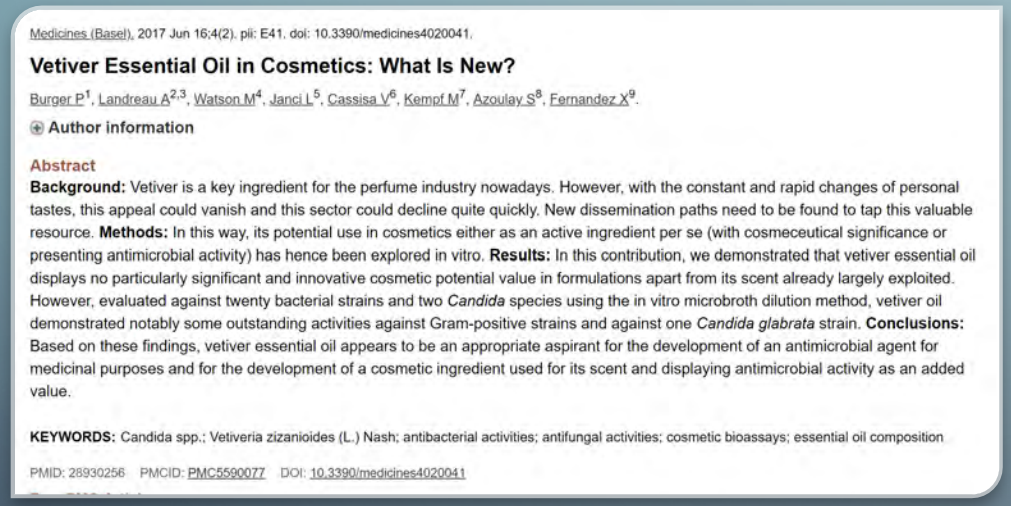
ESSENTIAL OILS MIGHT BE THE NEW ANTIBIOTICS

https://www.theatlantic.com/health/archive/2015/01/the-new-antibiotics-might-be-essential-oils/384247/

MAIN CHEMICAL COMPONENTS: CARVONE, ISOVALENCENOL, KHUSIMOL

THE VETIVER PLANT, VETIVERIA ZIZANIOIDES, IS A MEMBER OF THE GRASS FAMILY. THE MANY ROOTS OF THE PLANT GROW IN LARGE CLUSTERS UNDERGROUND. THE VETIVER ESSENTIAL OIL IS OBTAINED FROM THE ROOTS OF THE VETIVER PLANT.

VETIVER RESEARCH



Medicines (Basel). 2017 Jun 16;4(2). pii: E41. doi: 10.3390/medicines4020041.

Vetiver Essential Oil in Cosmetics: What Is New?

Burger P[1], Landreau A[2,3], Watson M[4], Janci L[5], Cassisa V[6], Kempf M[7], Azoulay S[8], Fernandez X[9].

Author information

Abstract

Background: Vetiver is a key ingredient for the perfume industry nowadays. However, with the constant and rapid changes of personal tastes, this appeal could vanish and this sector could decline quite quickly. New dissemination paths need to be found to tap this valuable resource. **Methods:** In this way, its potential use in cosmetics either as an active ingredient per se (with cosmeceutical significance or presenting antimicrobial activity) has hence been explored in vitro. **Results:** In this contribution, we demonstrated that vetiver essential oil displays no particularly significant and innovative cosmetic potential value in formulations apart from its scent already largely exploited. However, evaluated against twenty bacterial strains and two *Candida* species using the in vitro microbroth dilution method, vetiver oil demonstrated notably some outstanding activities against Gram-positive strains and against one *Candida glabrata* strain. **Conclusions:** Based on these findings, vetiver essential oil appears to be an appropriate aspirant for the development of an antimicrobial agent for medicinal purposes and for the development of a cosmetic ingredient used for its scent and displaying antimicrobial activity as an added value.

KEYWORDS: Candida spp.; Vetiveria zizanioides (L.) Nash; antibacterial activities; antifungal activities; cosmetic bioassays; essential oil composition

PMID: 28930256 PMCID: PMC5590077 DOI: 10.3390/medicines4020041

Vetiver Essential Oil in Cosmetics: What Is New?

https://www.ncbi.nlm.nih.gov/pubmed/28930256

RESOURCES

- Essential Oil Safety by Robert Tisserand & Rodney Young
- The Healing Intelligence of Essential Oils by Kurt Schaubelt
- Emotions & Essential Oils
- Aromatica by Peter Holmes
- Medical Aromatherapy by Kurt Schaubelt